Prepared for

Allied-Signal, Inc.
101 Columbia Road
Morristown, New Jersey 07960

HEALTH AND SAFETY PLAN FOR SITE CHARACTERIZATION ACTIVITIES RELATED TO THE LCP CHEMICALS - BRUNSWICK SITE REMOVAL ACTION

Prepared by

GeoSyntec Consultants
5775 Peachtree Dunwoody Road
Atlanta, Georgia 30342

Project Number GE3582-02

July 1994

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1. INTRODUCTION

1.1 Terms of Reference

This Health and Safety Plan (HASP) was prepared for Allied Signal Inc. (Allied) of Morristown, New Jersey by GeoSyntec Consultants (GeoSyntec). The HASP was prepared by Mr. Scott Simmons and Mr. Harold Gill, P.G., and it was reviewed by Mr. Steven Shugart, P.G., and Mr. Kirk Kessler, P.G., in accordance with the internal peer review policy of GeoSyntec.

1.2 Scope and Applicability of the Health and Safety Plan

This HASP describes measures that will be taken to ensure the protection of site workers during on-site work at the LCP Chemicals - Georgia plant (work site) near Brunswick in Glynn County, Georgia. The work is to be performed in accordance with the Unilateral Administrative Order (Order) for removal actions issued by the United States Environmental Protection Agency (USEPA). The USEPA issued the Order effective 4 April 1994 pursuant to its authority under Section 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) § 9607(a)(2). The Order requires that a site specific HASP be prepared by the Respondents for review and comment by the USEPA before commencing or undertaking any removal action.

This HASP was prepared in accordance with the USEPA's Standard Operating Safety Guides [USEPA, 1992]. In addition, the plan complies with applicable Occupational Safety and Health Administration (OSHA) regulations and with hazardous waste operations and emergency response (HAZWOPER) requirements as specified in Title 29 Code of Federal Regulations, Part 1910 (29 CFR 1910).

This HASP was prepared specifically to address the work associated with the facility decommissioning and site characterization actions required by the Order, and so was prepared in coordination with the Work Plan [GeoSyntec, 1993] for performing these actions. The purpose of the HASP is to define the requirements and designate the protocols for protecting personnel that will be performing the work by controlling the risk to health and safety during the investigation and decommissioning. Addenda to the plan will be required for excavation and other Removal Action activities.

In addition to this HASP, task-specific HASPs will be prepared by the approved subcontractors regarding specific health and safety issues for their specified work. The task-specific HASPs will be at least as stringent as this general site HASP.

Fifteen solid waste management units (SWMUs) have been identified on the work site. Each of the SWMUs is described in detail in the Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) report on the work site prepared by the Georgia Environmental Protection Division (Georgia EPD) dated 30 September 1990 [Georgia EPD, 1990]. USEPA has incorporated these SWMUs in the Order as potential sources or locations of CERCLA hazardous substances known to exist at the site (Section IV.7 of the Order). Other potential source areas are identified in the Order as well.

This HASP applies to all work associated with these SWMUs as well as work performed at other areas within the facility, including investigative sampling, decommissioning of plant buildings, and clean-up of tank cars. *Appendix A contains copies of safety information provided* by LCP that are applicable to specific plant operations.

1.3 Organization of the HASP

The remainder of this HASP is organized as described in the bullet items listed below.

- Section 2 lists the key personnel who will manage and conduct the work at the site and identifies the personnel responsible for directing and administering the site health and safety program.

- Section 3 describes the site, site history, and scope of work to be performed during this phase of the investigation and removal action.

- Section 4 presents the hazard assessment and an analysis of the health and safety risks of the variety of tasks and operations to be performed in carrying out the required actions.

- Section 5 describes the medical surveillance requirements for on-site personnel.

- Section 6 describes personnel training requirements for on-site personnel.

- Section 7 defines the levels of protection, the types of personal protective equipment (PPE), and inspection and protective program reassessment requirements of the various tasks and operations.

- Section 8 describes site control measures including communications and definition of work zones.

- Section 9 describes the decontamination plan including definition of levels of decontamination for personal protection, equipment decontamination, and decontamination waste disposal.

- Section 10 discusses the frequency and types of air monitoring and sampling that will be performed during activities at the site.

- Section 11 outlines the site health and safety standard operating procedures (SOPs), including availability of nearest medical assistance, safe working practices, and emergency alarm procedures.

- Section 12 presents the emergency response contingency plan.

- Section 13 describes confined space entry procedures.

- Section 14 presents a spill containment program for the work site.

- Section 15 describes the hazard communication and on-site recordkeeping and reporting program established to ensure that the presence and nature of known hazards on the work site will be communicated to all on-site personnel.

- Section 16 covers the site visitors policy.

2. PROJECT ORGANIZATION AND RESPONSIBILITIES RELATIVE TO HEALTH AND SAFETY

2.1 Overview

This section describes the job title and responsibilities of key health and safety project personnel. These personnel include the project manager, the site supervisor, subcontractors, the facility representative, and the site health and safety officer. Figure 2-1 (at the end of Section 2) is an organization chart showing key health and safety personnel for the proposed removal action at the work site. Each key position is described below.

2.2 Project Manager

The project manager is responsible for the management of all aspects of a project including health and safety. Applicable health and safety tasks include the following: (i) ensuring that all project personnel receive appropriate health and safety training before commencement of field activities; and (ii) ensuring that the necessary equipment and facilities are available to implement the health and safety plan.

The project manager is also responsible for the preparation of the HASP in accordance with applicable safety procedures. The project manager is responsible for: (i) making modifications to the plans; (ii) recommending changes to the field tasks if there are changes related to health and safety issues; (iii) ensuring that all required health and safety sampling or monitoring is performed; and (iv) ensuring that the required health and safety documentation is maintained. The project manager may assign some tasks to task managers or to the site health and safety officer for implementation. The project manager is responsible for forwarding a copy of the HASP to all key health and safety personnel.

2.3 Site Supervisor

The project manager may assign tasks within the project to one or more task managers or to the site supervisor. The site supervisor is responsible for the following: (i) ensuring that the health and safety aspects for their particular tasks are addressed; (ii) implementing appropriate work practices; and (iii) notifying the project manager of any changes in work conditions which affect the health and safety aspects of the task.

2.4 Subcontractors

All subcontractors will be provided with a copy of this HASP. The HASP must be reviewed by all subcontractors. Furthermore, subcontractors are required to comply with all applicable and appropriate Federal, state, and local laws, standards, and regulations. Subcontractors are also required to provide their own health and safety plan for work at the site. The subcontractor health and safety plan must be at least as stringent as this HASP.

2.5 Facility Representative

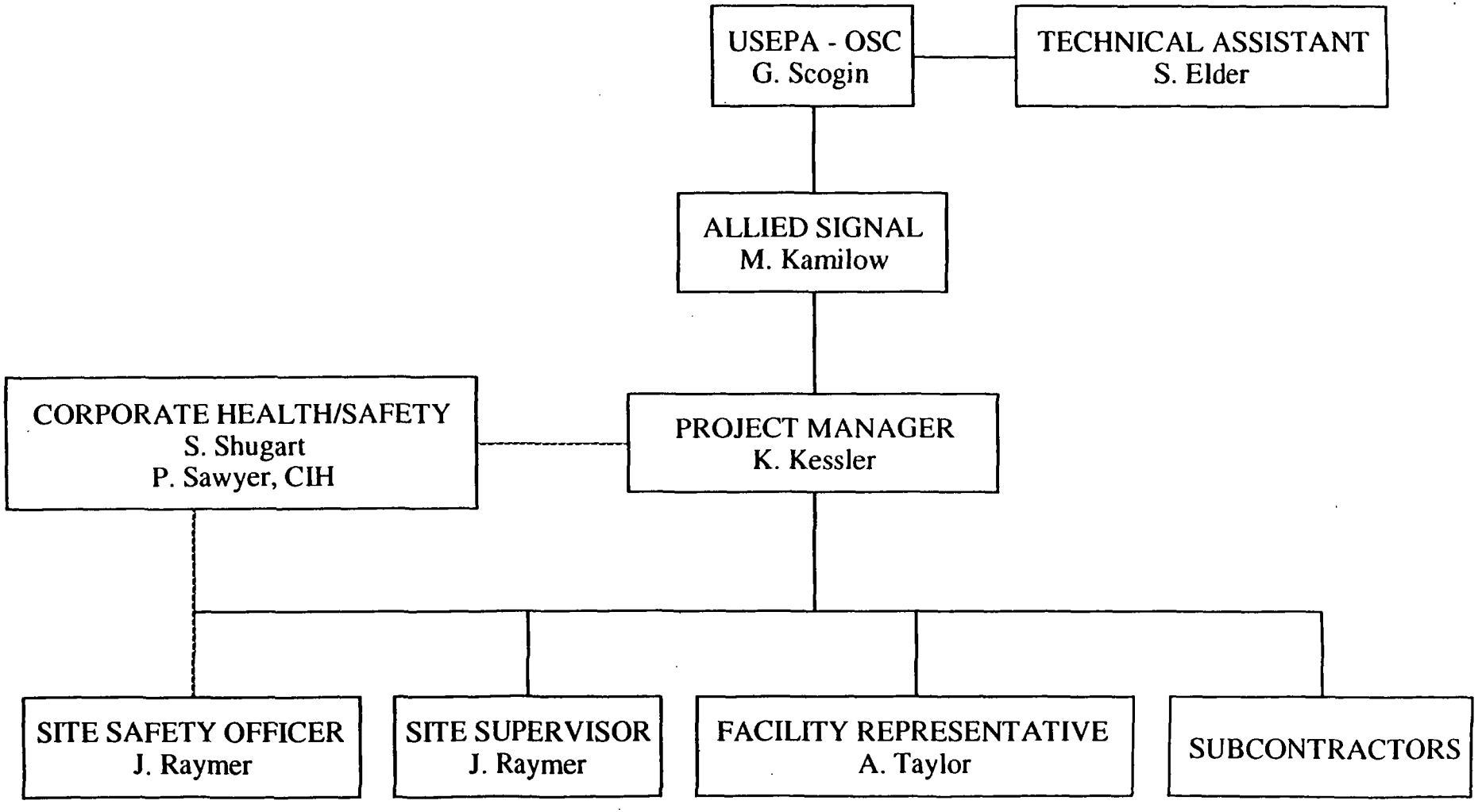
The facility representative is an employee of the facility. The facility representative is responsible for coordinating interaction between the activities of the project and the decommissioning of the facility. The facility representative is also responsible for ensuring that on-site facility personnel understand the applicable parts of the HASP (or emergency response plan) and that they comply with the HASP requirements. The facility representative will be kept appraised of all developments that occur in association with the project.

2.6 Site Health and Safety Officer (SHSO)

The site health and safety officer (SHSO) is responsible for the on-site implementation of the site health and safety plan, including all task-specific health and safety plans. The SHSO has the authority to modify or stop any work on the site if there is an imminent danger to the health and safety of site workers or the general public. The SHSO will be the site supervisor.

The SHSO will also maintain files of medical and training certificates and will maintain a health and safety log. The health and safety log will be maintained in a bound field book. Each page of the book will be numbered, dated, and signed. The time and circumstances of each entry will be recorded.

FIGURE 2-1
KEY HEALTH AND SAFETY PERSONNEL
LCP Chemicals - Georgia Site



3. SITE DESCRIPTION, HISTORY, AND SCOPE OF WORK

3.1 Overview

This section of the HASP provides a physical and historical overview of the work site. It also provides an outline of the scope of work that will be performed during the investigation and initial phases of the removal action. In Section 4 of this HASP, the scope of work is evaluated regarding health and safety issues.

3.2 Site Background

The LCP property is located in Brunswick, Georgia, along the Turtle River (Figure 3-1 located at the end of Section 3). LCP is bordered by Ross Road on the east, the Turtle River and associated marshes on the west, Glynn County property on the north, and the Brunswick Pulp and Paper - Georgia-Pacific Mill on the south. The entire site covers about 550 acres (224 hectares). Approximately 480 acres (195 hectares) consist of undeveloped tidal marsh. LCP's chemical manufacturing plant and remnants from previous site operations are clustered in the 70 acres (28 hectares) located in the central and southern portion of the site.

Industrial operations have been present on the LCP property since about 1919, when ARCO built a refinery at the site. The refinery operated until 1930. The city of Brunswick owned the property from 1930 until the mid 1930s, after which the site was purchased by the Georgia Power Company. Portions of the facilities were decommissioned during World War II for scrap metal. After the war, the Dixie O'Brien Paint Company purchased a portion of the site. Little is known about the previous owners' waste handling and disposal practices, but several solid waste management units (SWMUs) related to the earlier operations have been identified [Georgia EPD, 1990].

In 1955, Allied Chemicals Inc. (Allied) purchased the property and began the production of caustic soda (sodium hydroxide), chlorine, and hydrochloric acid. From 1968 to 1979, up to several thousand tons of waste sludge were placed in surface impoundments along the marsh edge (i.e., brine mud impoundments). In 1979, the facility was sold to LCP Chemicals-Georgia Inc. LCP continued production of chlorine gas, caustic soda, and hydrochloric acid until filing for bankruptcy in 1993. Current decommissioning and removal activities are being undertaken by Allied.

Allied and LCP manufactured chlorine gas by the chlor-alkali process. In the chlor-alkali process, a concentrated brine solution is electrolytically dissociated into elemental sodium and chlorine gas. The cathode in the electrolytic cell is elemental mercury. The anode in the electrolytic cell is a copper core and a graphite plate, collar, and stem. The chlorine gas accumulates at the anode and is removed, dried, and compressed for shipment. Sodium forms an amalgam with the mercury, which is reacted with water to remove the sodium as a 50 percent caustic solution (i.e., sodium hydroxide). Hydrogen gas is evolved in this process. Although the caustic solution and the chlorine gas are the primary products of the facility, a concentrated sodium hypochlorite solution may be produced. The facility also manufactures a small amount of hydrochloric acid by burning the hydrogen gas, evolved by amalgam separation, in the presence of chlorine.

Several site investigations have been performed at the LCP facility. During the investigations, chemical constituents related to former site operations have been detected in the soil, sediment, surface water, and ground water. The nature of the chemical constituents and ranges of detected concentrations are discussed in detail in the Work Plan.

3.3 Scope of Work

Allied is currently working on the decommissioning of the mercury cells and associated equipment within the plant. The anticipated work tasks that will be performed during the decommissioning and site characterization are listed in the following bullet items.

- *Site Mobilization.* Equipment for investigative operations and decontamination will be mobilized to the site and health and safety zones will be delineated on the site.

- *Mercury Cell Decommissioning.* The mercury cells and associated equipment will be decommissioned. The work tasks for mercury decommissioning will include:
  - removal of elemental mercury;
  - loading and off-site transportation of the mercury;
  - dismantling of the cells and associated equipment; and
  - decontaminating the resulting debris.

- *Wastewater and Other Process Liquids Treatment and Disposal.* Allied is currently engaged in the treatment and/or disposal of all remaining product materials. This process includes:
  - liquids in process vessels, tanks, and piping;
  - liquids and gases stored in tank cars;
  - transfer of these products to the treatment plant or transport to off-site facilities; and
  - neutralization and/or treatment of these products.

- *Mercury Contaminated Waste and Debris Disposal.* Potentially mercury-contaminated waste and debris will be located, decontaminated, and disposed. This work includes decontamination of:
  - the mercury retort still;

- waste and debris stored on the mercury retort pad; and
- other facility equipment.

- *Facility Structures Decontamination.* Portions of the facility will be decontaminated for mercury and other product materials (caustic, acids, chlorine, and wastewater). Included in this work is decontamination of:
  - the cell building;
  - storage vessels, tanks, and piping;
  - the tank cars; and
  - other buildings and structures.

- *Sampling.* Samples will be collected from throughout the LCP property to determine the concentrations and extent of the hazardous materials. The areas that will be sampled will include:
  - surface soils;
  - surface marsh and impoundment sediments;
  - subsurface soils;
  - surface water from the marsh and impoundments;
  - ground water from temporary piezometers and monitoring wells;
  - debris; and
  - the air.

- *Site Removal Response Activities.* The scope of removal response activities associated with contaminated environmental media and wastes has not been developed, as the scope is contingent upon the results of site characterization and evaluation of mitigation measures. This HASP describes general response action activities that will likely be implemented, such as excavation with heavy equipment. Details of the removal scope and associated health and safety aspects will be addressed as an addendum to this HASP.

SITE LOCATION

SOURCE: USGS BRUNSWICK EAST AND WEST QUAD MAPS, 1988

GeoSyntec Consultants
ATLANTA, GEORGIA

FIGURE NO.	3-1
PROJECT NO.	GE3582-02
DOCUMENT NO.	GA940493
FILE NO.	DF

4. HAZARD ASSESSMENT

4.1 Introduction

The potential hazards that may be encountered during the removal action at the LCP work site are variable. Of primary importance are the potential chemicals of concern, and the job or task that will be performed. This hazard assessment is organized accordingly and presents discussions on the site contaminants and the potential hazards associated with various tasks. The chemicals of concern and exposure information are presented in Section 4.2. A task-by-task hazard analysis is presented in Section 4.3. Finally, other site hazards are discussed in Section 4.4.

4.2 Chemical Hazards

4.2.1 Overview

The chemical constituents that have been detected on site are listed in Table 4-1 (at the end of Section 4). The table also presents the maximum detected concentrations of chemicals by medium. As shown in the table, the chemicals of concern fall into the following categories: (i) mercury and other heavy metals; (ii) polychlorinated biphenyls (PCBs); and (iii) other organic compounds. Each category of chemical constituents is discussed below.

4.2.2 Mercury and Other Heavy Metals

Mercury, lead, and barium have been identified as chemicals of concern on the site. Mercury has been detected in the following SWMUs:

brine mud impoundments, mercury retort area, former facility disposal area (referred to as the Allied disposal area), tank car area, south settlement tank area, north and south mercury loading areas, waste disposal impoundment area, outfall pond and ditch, and Purvis Creek. Lead has been detected in the brine mud impoundments, mercury retort area, former facility disposal area, south disposal area, waste disposal impoundment, and outfall pond. Barium has been detected in the brine mud impoundments and the north disposal area.

Mercury

Mercury is a silvery liquid with a density of 13.5 grams per cubic centimeter (g/cc) at 25 degrees Celsius (25°C). It does not oxidize at ambient temperatures, is immiscible in water, and reacts with nitric acid and hot sulfuric acid [Patnaik, 1992].

Elemental mercury, its inorganic salts, and organomercury compounds, are all highly toxic. It has a very low vapor pressure (i.e., 0.0018 torr at 25°C). Concentrations on site have been measured at levels which pose an inhalation hazard. Exposure to mercury vapors at high concentrations for a short period can cause bronchitis, pneumonitis, coughing, chest pain, respiratory distress, salivation, and diarrhea. The toxic symptoms due to its effects on the central nervous system (CNS) include tremor, insomnia, depression, and irritability. Some other symptoms include: headaches, fatigue, weakness, stomatitis, gastrointestinal disturbance, anorexia, proteinuria, and irritable eyes and skin. The toxicity of mercury compounds are variable with solubility (i.e., less soluble compounds are less toxic). Antidotes to mercury poisoning are available [Patnaik, 1992; National Institute for Occupational Safety and Health (NIOSH), 1990].

The exposure limits of mercury are as follows:

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• elemental mercury (including vapors)	0.025	0.05
• organic mercury compounds		
Alkyl compounds	0.01	0.01
Aryl compounds	0.1	-
[NIOSH, 1990; ACGIA, 1993]		
Note: (1) ACGIG - American Conference of Governmental Industrial Hygienists.		

The site supervisor has a copy of the LCP mercury hygiene program on file (Appendix A).

Lead

Lead is a silvery gray metal. It is lustrous when freshly cut, but loses its shine when exposed to air. It has a density of 11.35 g/cc at 20°C. It reacts with concentrated nitric, hydrochloric, and sulfuric acid [Patnaik, 1992].

Toxic routes of exposure to lead are food, water, and air. It is an acute as well as a chronic toxicant. The toxic effects depend on the dose and the nature of the lead salt. Chronic toxic effects may arise from occupational exposure. Acute toxic symptoms include ataxia, repeated vomiting, headache, stupor, hallucinations, tremors, convulsions, and coma. Such symptoms are manifested by the encephalopathic syndrome. Chronic exposure can cause weight loss, central nervous system effects, anemia, and damage to the kidney.

Chronic lead poisoning adversely affects the central and peripheral nervous systems, causing restlessness, irritability, and memory loss. Permanent brain damage has been noted among children from lead poisoning. Kidney damage arising from short-term ingestion of lead is reversible; while a longer-term effect may develop to general degradation of the kidney, causing glomular atrophy, interstitial fibrosis, and sclerosis of vessels. Inhalation of lead dusts can cause gastritis and changes in the liver. Lead is significantly bioaccumulated in bones and teeth, where it is stored and released [Patnaik, 1992].

The exposure limits of lead are as follows:

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• elemental Lead and inorganic compounds	0.05	0.10
[NIOSH, 1990; ACGIA, 1993]		

Barium

Barium is a yellowish-white, malleable metal. It is readily oxidized and has a density of 3.6 g/cc.

Inhalation of barium dusts can cause irritation of the nose and upper respiratory tract. All soluble salts of barium are acute poisons. Barium ion is toxic to muscles. Ingestion can cause sever hypokalemia. The toxicity of barium salts depends on its solubility. Ingestion of about 1 g of barium chloride or 4 g of barium carbonate can be lethal to humans [Patnaik, 1992].

The exposure limits of barium are as follows:

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• soluble barium compounds	0.5	0.5
• barium sulfate	10.0	-
[NIOSH, 1990; ACGIA, 1993]		

4.2.3 Polychlorinated Biphenyls (PCBs)

PCBs are a group of chloro-substituted biphenyl compounds. One to ten chlorine isomers can attach to the biphenyl rings to form over 200 isomers. Aroclor is the best known trade name for commercially produced PCBs. In the Aroclor series, the first two digits define the type of molecular structure and the last two digits are the weight percent of chlorine [Patnaik, 1992].

Aroclor 1268 was used to impregnate anode stems and collars used in the chlor-alkali process at LCP. The concentration of PCB in the anodes is known to range up to 3.5 percent by weight. Other PCBs detected on the site are Aroclors 1221, 1254, and 1260.

PCBs are moderately toxic substances and are suspected to be carcinogenic and cause birth defects. The toxicity of PCBs increases with increasing percentage of chlorine up to 54 percent. The toxicity then decreases. Occupational exposure to PCBs exhibit a broad range of adverse health effects on the skin, eyes, mucous membranes, and digestive and neurological systems. Symptoms on skin and mucous membranes from

chronic exposure to higher chlorine percentage Aroclors are chloracne, dermatitis, hyper pigmentation of the skin, discoloration of the finger nails, thickening of the skin, swelling of the eyelids, and burning and excessive discharge from the eyes. Digestive system symptoms are nausea, vomiting, abdominal pain, and anorexia. Extreme poisoning can result in jaundice and acute yellow atrophy of the liver. Symptoms of neurotoxicity are headache, dizziness, fatigue, depression, weight loss, and occasionally, pain in joints and muscles [Patnaik, 1992].

NIOSH [1990] and ACGIH [1993] have established exposure limits only for Aroclor 1242 and Aroclor 1254. Because all PCBs are generally similar, and because Aroclor 1254 is the most hazardous, GeoSyntec believes that adoption of the Aroclor 1254 standard is a prudent, conservative, and practical means of establishing exposure limits for site operations. The established exposure limits for PCBs are given below.

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• Aroclor 1242	1.0	1.0
• Aroclor 1254	0.5	0.5
• Adopted site standards	0.5	0.5

[NIOSH, 1990; ACGIH, 1993]

As PCBs are suspected to be human carcinogens, the recommended time weighted average (TWA) exposure limit is 0.001 mg/m^3.

For this project, the primary exposure route of concern for PCBs is dermal absorption. PCBs absorb readily through skin and dermal protection should be worn. Due to the low vapor pressure of PCBs,

inhalation of vapors is not considered to be a potential route of exposure. This MSDS for PCBs is included in Appendix A.

4.2.4 Other Organic Compounds

As stated previously, other organics have been detected at the LCP work site. The organic constituents are listed in Table 4-1. Other than PCBs, the remaining organics can be generally categorized as either volatile organic compounds (VOCs) or semi-VOCs (SVOCs). Over 140 organic compounds have been detected at the site during past site investigations. Therefore, it is impractical to evaluate all of the health and safety issues (e.g., monitoring, personal protective equipment responses, etc.) for all of the organic compounds. Rather, to protect site workers from potential exposures to organic compounds, a minimum level of protection is established for intrusive type activities. The minimum level of protection may be upgraded or downgraded depending on findings during the investigation. The applicable levels of protection and monitoring activities for intrusive activities are described in later sections of this HASP.

4.2.5 Process Solids, Liquids, and Gases

Also present at the site are several chemicals created or used by the Chlor-alkali process. Discussions with the facility staff indicate that four chemicals remain on-site: (i) chlorine gas; (ii) caustic; (iii) hydrochloric acid; and (iv) sulfuric acid. These chemicals are addressed below. More safety information regarding these chemicals is available on file with the site supervisor.

4.2.5.1 Chlorine

Chlorine is a greenish-yellow to brown gas with a pungent and irritating odor. It is frequently stored under pressure as a liquid. Some of the tank cars are known to contain liquid and/or gaseous chlorine.

Inhalation of chlorine causes a burning of the eyes, nose, and lungs. Acute inhalation exposure can result in coughing, choking, severe burns in the respiratory tract and eventually pulmonary edema, pneumonia, and death.

The exposure limits for chlorine are as follows:

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• chlorine gas (Cl_2)	1.5	1.5

4.2.5.2 Caustic

Caustic (or caustic soda, sodium hydroxide, NaOH) is a colorless to white solid or may be stored in aqueous solution. Large volumes are in storage at the facility and in the tank cars.

Inhalation of caustic can result in irritation and burning of the respiratory tract. Dermal contact with sufficiently concentrated caustic can cause burns. As caustic is a strong base, it reacts strongly and with great heat with acids and water.

The exposure limits for caustic are as follows:

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• caustic vapor	2.0	2.0

4.2.5.3 Hydrochloric and Sulfuric Acid

Both hydrochloric (HCl, hydrogen chloride, muriatic acid) and sulfuric (H_2SO_4) acid are stored and used at the facility. Hydrochloric acid is a colorless to slightly yellow gas with an irritating odor or may be stored as an aqueous solution. Sulfuric acid is a colorless to dark brown odorless liquid and may also be stored as an aqueous solution.

Inhalation or dermal contact of either acid results in possibly severe burns of the respiratory tract or skin. Both acids react strongly with bases, water, and metals.

The exposure limit for hydrochloric acid (Ceiling Limit) and sulfuric acid (TWA) are listed below:

	ACGIH[1] (mg/m^3)	NIOSH (mg/m^3)
• hydrochloric acid	7.5	7.0
• sulfuric acid	1.0	1.0

4.3 Other Potential Hazards

4.3.1 Introduction

Other potential hazards include: (i) hazards related to plant operations; (ii) heat stress; (iii) physical hazards; and (iv) environmental hazards. Each of these potential hazards are discussed in the following paragraphs.

4.3.2 Plant Operation Hazards

LCP has discontinued operation of the chlorine gas manufacturing operations. However, there are still approximately 80 rail tank cars on-site that contain chlorine. Therefore, the potential for a release of chlorine gas is the primary hazard associated with plant operations. The chlorine in the tank cars will be purged through the waste water treatment facility on-site.

A secondary hazard is the potential release of hydrogen chloride vapor. This hazard and the procedures to mitigate it are addressed in the facility emergency response plan (Section 12 of this HASP and Appendix A). Prior to undertaking any activity at the site, a facility representative will instruct the site supervisor about emergency response requirements. It is the responsibility of the site supervisor to ensure that project participants are informed of this hazard and the mitigation procedures.

4.3.3 Heat Stress

4.3.3.1 General

Heat stress may be a potentially significant hazard associated with this project. The danger of heat stress associated with this project is aggravated by the factors listed in the following bullet items.

- The site is unshaded in many areas and is located on the edge of an inland tidal marsh on the Georgia coast. In the summer the climate is very hot and humid.

- The brine mud waste in the impoundments is white and highly reflective of solar radiation. This condition increases the chance of sunburn and dehydration.

- Due to the requirements of this project, personal protective equipment (PPE) (i.e., either Level B, C, or D) will be worn. PPE retards heat radiation and evaporation of moisture on the surface of the skin, which significantly impedes the body's natural means of cooling.

4.3.3.2 Types of Heat Stress

Heat stress is progressive in intensity. The following three types of heat stress may be observed: (i) heat cramps; (ii) heat exhaustion; and (iii) heat stroke. Heat cramps are a lower level of heat stress. The symptoms of heat stress are spasms in the abdomen and limbs. Frequent rest periods and fluid intake are appropriate measures to reduce and eliminate heat cramps.

Heat exhaustion results from severe dehydration. Heat exhaustion symptoms include pale, clammy skin, profuse sweating, headaches, nausea, pounding heart, and dizziness. If any of these symptoms occur, site workers should leave the site, decontaminate properly, find a shady location, and drink fluids slowly.

Heat stroke is the most serious stage of heat stress and is life threatening. It occurs when the body temperature regulating system is no longer functioning properly. Heat stroke symptoms include hot, dry skin, a high fever (i.e., over about 106 degrees F or more), dizziness, nausea, rapid pulse, and unconsciousness. If heat stroke occurs, the body temperature should be reduced quickly and medical attention should be secured.

4.3.3.3 Heat Stress Safety Program

Heat stress is of primary concern for outdoor sampling and remediation activities during the hot season of the year. Heat stress is considered to be of lesser concern for indoor activities and for activities performed during the cool season. The plan presented for monitoring and mitigating heat stress applies only to outdoor sampling and remediation activities during the hot season of the year.

Heat stress will be monitored using the following program.

- Workers will observe one another throughout the day for symptoms of heat stress.

- Medical-type oral thermometers will be used to monitor deep body temperature. Measurements will be taken on all workers at the start of work, end of work, and whenever a worker complains of or is observed to have symptoms of heat stress.

- Pulse will be measured whenever deep body temperature is measured.

- As an alternative to temperature and pulse monitoring, the Wet Bulb Globe Temperature (WBGT) method may be used as described in ACGIH [1993]. Due to the complexities of WBGT monitoring, this method will be used only when body temperature monitoring is impractical.

Heat stress will be mitigated using the following program.

- Work will be scheduled and paced to reduce the potential for heat stress.

- Water will be provided for workers to drink throughout the day.

- Shaded areas will be provided for resting during the work day.

- If a person's deep body temperature exceeds 38°C (100.4°F) at any time during the day, the person will be excused from work and placed on sick leave for the remainder of the day.

- If a person exhibits symptoms of heatstroke, an ambulance will be called immediately and immediate action will be taken to lower the person's body temperature.

4.3.4 Physical Site Work Hazards

4.3.4.1 Trenching

Trenching at the site will be conducted from stable, firm ground and will involve trenches anticipated not to be deeper than 5 ft. No entry

into the trenches by site personnel is expected or planned. Potential physical hazards associated with trenching involve: (i) injury from heavy equipment; and (ii) collapse of the trench. Injury from the heavy equipment can be minimized by observing the following: (i) ensuring that safety equipment is operational on the heavy equipment (i.e., safety belts and back-up signals); (ii) observing safe operational speeds; (iii) ensuring that all personnel in the vicinity of the heavy equipment are aware of the proposed activities of the machinery (i.e., activities involving heavy equipment should be discussed in the morning safety meetings); and (iv) ensuring that no heavy equipment operators use intoxicating substances while operating the equipment.

As no entry into the trenches is anticipated, collapse is not likely to be an applicable safety issue. For reference, the OSHA trenching regulations are found in 29 CFR 1926 Subpart P (i.e., excavations).

4.3.4.2 Cutting Torches

As part of the decommissioning of the facility and removal of debris, metal may be cut into manageable-sized pieces. The use of cutting torches poses three potential hazards:

- burns through contact with the torch flame or hot metal;
- hazardous vapors inside piping and on metal surfaces; and
- retinal damage due to looking at the flame without proper eye protection.

Safety glasses or face shields with the appropriate protective eye filters and gloves are to be worn during torch operation. A burning/welding permit must be filled-out and approved by the SHSO or

designate. Only qualified operators should be allowed to use the torches. An example of the burning/welding permit is included in Appendix A.

4.3.4.3 Other Equipment

Other equipment to be used in the investigative and removal actions might include drilling rigs, power augers, hand augers, jackhammers, brush-clearing tools, and other small tools. Personnel at the site should be familiar with safe operating procedures for any equipment they use or supervise. Use of equipment should be discussed in the morning safety meetings at the site.

4.3.4.4 Electrical Hazards

Some aspects of the decommissioning and removal action will either require the use of electrical equipment or involve work around exposed portions of the facility's power system. Some general safety procedures are outlined below.

- Workers should never work with electrical equipment while standing in water or on a wet surface.
- Before any work is begun on or near the facility's existing electrical system, all power to the work area must be turned-off and tagged-out.
- During decontamination of areas containing electrical wiring, all power must be shut-off and tagged-out in the area to be decontaminated.

- All sources of sparks must be de-activated if combustible fumes are present.

The site supervisor has a copy of the lockout/tagout procedure on file (Appendix A).

4.3.4.5 Weakened Facility Structures

To the west of Cell Building No. 1 is a steel-grid deck which is heavily corroded in places. The platform existed in a formerly corrosive atmosphere. Before any workers are to walk on the platform, damaged flooring must either be patched and/or covered with plywood or marked for no entry with barring tape. Other areas similarly damaged must be identified and either repaired or restricted. Routine inspections will be performed to identify weakened structures.

4.3.4.6 Back Strain

Some aspects of this work may involve the lifting of heavy objects and therefore the potential for back strain. Site workers should observe safe lifting procedures as follows:

- avoid lifting objects that are too heavy without help;
- lift with the back in a vertical position - use legs for strength;
- wear a back support, if necessary; and
- let the machinery do all of the lifting that is practical.

AFFIDAVIT OF HEALTH & SAFETY TRAINING

I certify either: (i) that I have read and understood this health and safety plan; or (ii) that the contents of the health and safety plan have been explained to me.

PRINTED NAME	COMPANY	SIGNATURE	DATE
RICHARD G. GREGORY	LCP CHEMICALS	Richard G Gregory	8-4-94
Julius Campbell	L.C.P. Chemicals	Julius Campbell	8-8-94
Chuck Arnett	LCP Chemicals	Chuck Arnett	8-9-94
Robert Baker	L.C.P. Chemicals	Robert Baker	8-10-94
ALVIN Jones	L.C.P. Chemical	Alvin Jones	8-18-94

It is up to the supervisor for each work group or subcontractor to decide if back supports are necessary for that crew.

4.3.4.7 Noise

Much of the work at the site will involve the use of heavy machinery, jackhammers, and power tools. All of these will be the source of noise. Excessive noise can result in headaches, irritability, and temporary, or eventually, permanent hearing loss. Site personnel should follow the hearing protection procedures recommended by the manufacturers of the equipment.

Site workers exposed to a time-weighted average sound level of 85 decibels on the A-weighted scale (dBA), feasible administrative or engineering controls should be implemented. Site personnel exposed to excessive noise will be provided with hearing protection devices that effectively protects the worker. OSHA regulations for hearing protection will be followed on the site. The OSHA hearing regulations are found in 29 CFR 1910.95.

4.3.5 Environmental Hazards at the Site

The work area for this site is located adjacent to a tidal marsh and woodland. Wildlife hazards associated with the area include alligators, snakes, ticks, spiders, scorpions, bees, and fire ants. Snake chaps are recommended for anyone working in the marsh areas and near undergrowth. Anyone bitten by a snake should be taken to the hospital for treatment as appropriate. Persons working in vegetated areas should routinely inspect themselves for ticks. Tick bites that swell or discolor should be treated by a physician. Nuisance insects are also present, and

include mosquitos, gnats, and biting flies. The use of insect repellent may be necessary at the site.

4.4 Task-by-Task Risk Analysis

4.4.1 Introduction

Many of the specific tasks associated with the removal response activities will be repeated at several locations within the site. Rather than outline the task structure for each aspect of the work, this HASP will present task-by-task risk analysis for the three basic operations to occur: (i) investigative sampling; (ii) decommission operations; and (iii) removal response activities.

4.4.2 Investigative Sampling

The principal hazards associated with the investigative sampling are actual contact with hazardous substances and exposure to unknown vapors emitted from subsurface soils. This may occur through inhalation or skin contact. Hazardous substances which might be encountered are presented in Section 4.2 of this HASP. The majority of the investigative sampling involves minimal exposure potential. In most cases sampling will be accomplished using a hand auger or similar device to obtain a small volume of waste or soil. Sample compositing, where required by the work plan, will be performed in a large stainless steel mixing bowl designed to fully contain all of the material being composited. Certain minimum personal protective equipment such as Tyvek™ suits and gloves must be worn during any sampling activity involving the potential exposure to hazardous substances. Protection from dermal content is the primary concern. The greatest potential for exposure will occur when test pits are excavated and potentially contaminated material is exposed at the

surface. During test pit excavation, greater precautions are warranted. Respiratory protection must be upgraded (i.e., Level B) during test pit excavation activities until such time air monitoring allows for a downgrade to a lesser level. The required personal protection equipment for investigative sampling is discussed in Section 7 of this HASP.

Heat stress and general physical and biological hazards, such as tripping, falling, and snake or insect bites are also potential factors in all operations. Other types of potential hazards are discussed in Section 4.3.

4.4.3 Decommissioning Operations

Decommissioning of the LCP plant involves numerous potential hazards. Perhaps the most significant is the decommissioning of the mercury cells. As much as 450,000 pounds (204,500 kg) of elemental mercury were stored in the cells. Most of this material has already been removed and shipped off-site. Some elemental mercury is still entrapped in the cells and decommissioning operations will potentially expose personnel to mercury vapors. Physical contact with the mercury is very possible during its removal.

Exposure to hazardous chemicals other than mercury is also possible. Decommissioning will involve dismantling of equipment at the plant. Potential hazards include collapse of structures, sharp protruding objects, operation of heavy equipment and tools, release of chlorine, and general physical hazards, such as tripping and falling. Heat stress is a potential hazard and should be monitored closely.

Other activities and associated hazards for specific decommissioning tasks are presented below.

4.4.3.1 Cleaning of Tank Cars

The cleaning of the tank cars at the site involves two potential safety issues: (i) exposure to hazardous substances and reactions; and (ii) confined space entry. If entry into a tank car is necessary, the workers must understand the confined space entry procedures detailed in Section 13.

Two chemicals of concern are identified to be in the tank cars: chlorine and caustic. More information on the hazards posed by these substances can be found in Section 4.2.5. When working on the tank cars, it is essential that proper PPE is used. Workers should avoid splashing the material, either during transfer or clean-up of the liquids. Transfer of both chlorine and caustic will be required for some tank cars. The facility has an established procedure for this type of work which will be followed. For the transfer of caustic, the spill containment procedure in Section 14 is to be used. Safety issues regarding chlorine gas release are covered in Section 4.2.5. Appendix A includes safety information on transferral of material in tank cars as well as the Site Emergency Response/Action Plan.

A few tank cars contained waste waters. The primary concerns for the cleaning of these cars are low oxygen and/or high organic concentrations. Elevated mercury levels will also be encountered. Safety procedures outlined in the confined space entry Section 13 must be followed.

Water reacts strongly with caustic, generating sufficient heat to ignite combustible substances and materials. Water should not be mixed with pooled caustic. Chlorine reacts strongly and explosively with many common substances, including hydrogen and gasoline, both of which are present locally at the site.

4.4.3.2 Cleaning of Vessels and Tanks

Many of the safety measures required for vessel and tank cleaning are dependent upon the substances within those vessels. Accurate identification of the contents must be made before a tank or vessel is cleaned. Dependent on the constituents, the appropriate sections of this HASP should be referenced for information on the hazards posed by the vessel contents. The other principal hazard associated with this work involves confined space entry. If entry into a tank or vessel is required, the workers must understand the confined space entry procedures as explained in Section 13. See Appendix A for more information on safety issues regarding work on piping.

4.4.3.3 Decontamination of the Plant Buildings

Many hazards associated with decontamination of the plant buildings are detailed elsewhere in this HASP and will be referenced appropriately. As equipment and structures are dismantled, protruding metal and weakened floors and walls will present hazards to workers. Section 4.3.3.5 discusses safety precautions for areas with corroded/structurally weakened flooring. Ladders may be used for workers to reach some portions of the buildings. Workers should always practice the buddy system when using ladders.

During the final decontamination of the buildings, hazardous chemicals might be released or concentrated. Workers should have the proper PPE to protect them from substances anticipated to be present. If the building interiors are to be washed with water, two potential hazards must be avoided. First, the water might react with substances on the walls or in cracks and hollows. Refer to the appropriate sections of this HASP for discussions of chemicals that might be encountered. Workers should not stand under the water running off structures, as it

may be caustic or contaminated. Second, workers must be certain that the electricity in the building is turned off and tagged-out to prevent electrocution.

At the beginning of each work day, air in the cell buildings are routinely sampled for mercury. The facility has set an action level of 0.05 mg/m^3 of airborne mercury. Concentrations above this level require that all workers in the cell buildings wear level C PPE. Workers are automatically in Level C if they are opening the mercury cells or dismantling or repairing lines to the cells. All workers inside the cell buildings, on either floor, must have respiratory on their person. In the absence of air monitoring, respiratory must be worn.

4.4.3.4 Treatment and Neutralization of Chemicals

Some of the caustic on-site will need to be filtered prior to possible sale. If this proves unsuccessful or uneconomic, the caustic will be neutralized with hydrochloric (muriatic) acid or possibly sulfuric acid and then treated. Workers must avoid dermal contact with any of the substances used in this procedure. Refer to Section 4.2.5 for more details on safety issues pertaining to these chemicals.

4.4.4 Site Removal Response Actions

Site removal response actions may involve the movement of large volumes of soil and debris. This material will contain hazardous materials as described in Section 4.2. Other potential hazards include operating around heavy machinery, open pits and trenches, unstable soil and debris piles. Heat stress is a potential hazard, because the operations will be performed in Level B or C protection. Until the site investigation activities are completed, it is not possible to determine

what specific hazards will be associated with site mitigation. When the site investigation phase is completed, addenda will be issued to the HASP to address potential specific hazards during site mitigation.

TABLE 4-1

CONSTITUENTS DETECTED
LCP Chemicals - Georgia Facility

Parameter	Soil Max ppb	Water Max ug/L	Air Max ppb/vol	Hazard Rating	vapor pressure mm	vapor pressure @ deg C	CL	TWA	STEL	units
Mercury (Hg)	3800000	24000	2000000	3	0.002	25	0.05	0.05		mg/m3
Lead (Pb)	32000000	2500		3	1	973		0.05		mg/m3
Barium (Ba)	14508000	20000		3	10	1049		0.5		mg/m3
1,1,1-Trichloroethane			2.2	3	100	20		350	450	ppm
1,1,2,2-Tetrachloroethane	54			3				1		ppm
1,2,4-Trichlorobenzene	750 J			3	1	38.4	5			ppm
1,2,4-Trimethylbenzene			1.7 J	2						
1,2-Dichlorobenzene	150 J			3			50			ppm
1,2-Dichloroethane	11			3	100	29.4		1	2	ppm
1,2-Dichloropropane	3 J			3	40	19.4		75	110	ppm
1,3-Dichlorobenzene	2100 JN	8 J		3						
1,4-Dichlorobenzene	1800			3	10	54.8		75	110	ppm
1-Methylnaphthalene		30 JN		2						
2,4,6-Trichlorophenol		7 J		3	1	76.5				
2-Methylnaphthalene	1600000	360 JN		2						
4,4'-DDD	16 J			3						
4,4'-DDE	16 J			3						
4-Ethyltoluene			1.3	1						
Acenaphthene	4200 J			1	10	131.2				
Acenaphthylene	130 J			D						
Acetone	700 JN	85 JN		3	400	39.5		750	1000	ppm
Acetyloxyhexanone	3000 JN									
Aldrin		.05 J		3				0.25		mg/m3
Anthracene	80000 J			3	1	145		0.2		mg/m3
Aroclor 1221	84000			2				0.001		mg/m3
Aroclor 1254	87000	12 J		3				0.5		mg/m3
Aroclor 1260	130000	37 JN		3				0.001		mg/m3
Benzanthracenone	10000 JN			3						
Benzene	3 J	1 J		3	100	26.1	25	1	5	ppm
Benzeneacetic acid		300 JN		2						
Benzenepropanoic acid		300 JN								

TABLE 4-1

CONSTITUENTS DETECTED
LCP Chemicals - Georgia Facility

Parameter	Soil Max ppb	Water Max ug/L	Air Max ppb/vol	Hazard Rating	vapor pressure mm	vapor pressure @ deg C	CL	TWA	STEL	units
Benzo(a)anthracene	76000 J			3						
Benzo(a)pyrene	10000 J			3				0.2		mg/m3
Benzo(ghi)perylene	3900 J			D						
Benzo(B and/or K)fluoranthene	14000 J			3						
Benzofluorene	40000 JN			3	0.01	20				
Benzoic acid	2400 J	850 J		3	1	96				
Benzonaphthothiophene	8000 JN									
Benzopyrene	7000 JN									
Benzothiazolone		40 JN								
Benzyl alcohol		9 J		3	1	58				
beta-BHC	200			3						
bis(2-Ethylhexyl) phthalate	3200 J	3 J		3				5	10	mg/m3
Bromodichloromethane	22			3						
Carbon disulfide	17	14		3	400	28	30	4	12	ppm
Carbon tetrachloride	160			3	100	23	25	2		ppm
Chlorobenzene	210			3	10	22.2		75		ppm
Chlorocyclohexane		2000 JN								
Chlorocyclohexanone		70 JN		2						
Chloroform	15000 J	42 N		3	100	10.4	50	2		ppm
Chrysene	100000 J	3 J		3						
Cyclohexane		60 JN		3	100	60.8		300		ppm
Cyclohexylcyclohexylundecane		20 JN								
Cyclohexylidenebisbenzene	8000 JN									
Cyclopropylcyclohexane	10000 JN									
Di-n-butyl phthalate	510	3 J		3				5		mg/m3
Di-n-octyl phthalate	670 J			2						
Dibenzo(A,H)anthracene	1400 J			3						
Dibenzofuran	1800									
Dichlorocyclohexane		700 JN								
Dieldrin	890			3				0.25		mg/m3
Dihydrodimethylindene		100 JN								

TABLE 4-1

CONSTITUENTS DETECTED
LCP Chemicals - Georgia Facility

Parameter	Soil Max ppb	Water Max ug/L	Air Max ppb/vol	Hazard Rating	vapor pressure mm	vapor pressure @ deg C	CL	TWA	STEL	units
Dihydromethanonaphthalene	1000000 JN									
Dimethylcyclohexane	30000 JN			3						
Dimethylheptane	20000 JN			2						
Dimethylhexane	200000 JN			2						
Dimethylnaphthalene	1000000 JN	40 JN								
Dimethyloctane	300 JN									
Dimethyl phthalate	83 J			2	1	100.3		5		mg/m3
Dimethylpropenylbenzene		80 JN								
Dimethylundecane	60 JN									
Dimethymethylethylbenzene		40 JN								
Dioxane			30 JN	3	40	25.2		25		ppm
Endosulfane I		.05 J								
Endosulfane II	16 J									
Endrin	16 J			3				0.1		mg/m3
Ethenylmethylbenzene	2000 JN	70 JN								
Ethylanthracenenedione	200 JN									
Ethylbenzene	78000	220 J		3	10	25.9		100	125	ppm
Ethylcyclohexane	10 JN									
Ethyldimethylbenzene	900000 JN	40 JN								
Ethyldimethylheptane		100 JN								
Ethyldimethylhexene	100 JN									
Ethylideneindene	2000 JN	200 JN								
Ethylmethylbenzene	1000000 JN			1						
Ethylmethylcyclohexane	50000 JN	200 JN								
Ethylmethylheptane	200 JN	30 JN								
Ethylnaphthalene	2000 JN									
Fluoranthene	68000	4 J		3	0.01	20				
Fluorene	57000									
Freon 11			4.8 J	1						
Freon 113			36 JN	1				1000	1250	ppm
Freon 12			3.1	1						

TABLE 4-1

CONSTITUENTS DETECTED
LCP Chemicals - Georgia Facility

Parameter	Soil Max ppb	Water Max ug/L	Air Max ppb/vol	Hazard Rating	vapor pressure mm	vapor pressure @ deg C	CL	TWA	STEL	units
Halowax	2000 JN			3				2		mg/m3
Heptachlor epoxide	84	.05 J		3						
Heptane	200000 JN			3	40	22.3		400	500	ppm
Hexachlorobenzene	120000			3	1	114.4				
Hexachlorobutadiene	540 J			3				0.02		ppm
Hexachlorocyclopentadiene	74 J			3				0.01		ppm
Hexachloroethane	1600			3	1	32.7		1		ppm
Hexadecanoic acid	900 JN	20 JN		3						
Hexanoic acid		50 JN		2	0.18	20				
Hydroxymethyoxy benzaldehyde		80 JN								
Indeno(1,2,3-cd)pyrene	4300 J			3						
Isophorone	220 J			3	1	38		4		ppm
Methyl Isobutyl Ketone	180 J			3	16	20		50	75	ppm
Methylanthracene	20000 JN			3						
Methylbenzaceanthrylene	300 JN									
Methylbenzonapthothiophene	400 JN									
Methylchrysene	1000 JN			3						
Methylcyclohexane	200000 JN			3	40	22		400		ppm
Methylcyclopentane		50 JN		3	100	17.9				
Methylene chloride			11	3	380	22	1000	500		ppm
(Methylethyl)benzene	20 JN									
Methyl ethyl ketone	32			3	71.2	20		200	300	ppm
Methylhexanoic acid		200 JN								
Methylpentene	10 JN									
Methylphenanthrene	20000 JN									
Methylpropanenitrile	10 JN									
Methylpropenylbenzene		300 JN								
Methylpropylbenzene		50 JN								
(Methylpropyl)cyclohexane	100 JN									
Methylpyrene	30000 JN									
Methyltriphenylene	200 JN									

CONSTITUENTS DETECTED
LCP Chemicals - Georgia Facility

Parameter	Soil Max ppb	Water Max ug/L	Air Max ppb/vol	Hazard Rating	vapor pressure mm	vapor pressure @ deg C	CL	TWA	STEL	units
Naphthalene	700000	190 J		3	1	52.6		10	15	ppm
Nitropropane	20 JN									
Nonane	100000 JN			3	10	38		200		ppm
Nonone	20 JN									
Octacosane	3000 JN									
Octahydrohexamethylindene	10000 JN	400 JN								
Octane	100000 JN			3	10	19.2		300	375	ppm
Pentachlorobenzene	400 JN			2						
Pentachlorophenol	530 J	6 J		3	40	211.2		0.5		mg/m3
Phenanthrene	400000			3	1	118.3		0.2		mg/m3
Phenol	55 J	68 J		3	1	40.1		5		ppm
Phenylbenzonaphthothiophene	700 JN									
Propylbenzene	20 JN			3	10	43.4				
Propylcyclohexane	10000 JN									
Pyrene	240000	5 J		3				0.2		mg/m3
Tetrachlorobenzene	700 JN									
Tetrachloroethene	410	1 J		3	15.8	22	200	25	200	ppm
Toluene	110000	8 J	5.7	3	36.7	30	300	100	150	ppm
Trichloroethene	140	1 J								
Trimethylbenzene	100000 JN	50 JN		1				25		ppm
Trimethylcyclopentane		200 JN								
Trimethyldecane		30 JN								
Trimethylnaphthalene	30000 JN									
Trimethylnonene		20 JN								
Trimethylphenanthrene	9000 JN									
Vinyl Acetate	31			3	100	21.5		10	20	ppm
Xylenes	350000	73 J	3.8 J	3	6.72	21		100	150	ppm

5. MEDICAL SURVEILLANCE REQUIREMENTS

5.1 Overview

All personnel who engage in the work involving potential exposure to hazardous substances for this project will be participants in a medical monitoring program for personnel involved in hazardous waste operations. This medical monitoring program must meet the minimum requirements of 29 CFR 1910.120(f). Certificates or letters (or copies thereof) documenting that each person is in a medical monitoring program and that each person is medically fit to work on hazardous waste sites will be maintained on site by the site supervisor and will be available for inspection at any time.

This section of the HASP discusses the general requirements for medical monitoring required in OSHA regulations for hazardous waste sites (i.e., 29 CFR 1920.120(f)).

5.2 Baseline or Preassignment Monitoring

The baseline medical exam will include:

- history and physical;
- executive profile;
- full vision screen;
- blood chemistry and heavy metal screening;
- urinalysis;

- electrocardiogram (EKG);
- spirometry;
- chest X-ray (2 views);
- audiometry;
- hemoccult slides (if recommended by the physician);
- tuberculosis (TB) skin test and tetanus toxoid; and
- flexible sigmoid (if needed).

5.3 Periodic Monitoring

A periodic exam will be required if any worker develops signs or symptoms related to the possible overexposure to hazardous substances or is exposed while unprotected in an emergency situation. Hence, should any worker believe that an exposure has occurred, the SHSO must be advised immediately. The scope of the periodic monitoring exam will be left to the discretion of the examining physician.

5.4 Exit Physical

The exit physical for a worker will be conducted upon termination of employment at the site. This physical will include all items listed for the baseline medical exam.

6. PERSONAL TRAINING REQUIREMENTS

6.1 Overview

This section provides an overview of the training background required for each person involved in on-site work during this project. Training related meetings are also discussed.

6.2 Preassignment and Annual Refresher Training

All project personnel who engage in the field work or decommissioning will have completed 40 hours of health and safety training for hazardous waste operations with annual eight hour refresher training as required under 29 CFR 1910.120(e). Certificates (or copies thereof) documenting this training will be maintained on site by the site supervisor and will be available for inspection at any time.

6.3 Site Supervisors Training

The site supervisor will have completed 40 hours of health and safety training for hazardous waste operations with annual eight hour refresher training as required under 29 CFR 1910.120(e). In addition, the site supervisor must also have completed eight hours of additional supervisory training. Certificates (or copies thereof) documenting this training will be maintained on site by the site supervisor and will be available for inspection at any time.

6.4 Training and Briefing Topics

Before any worker new to the project begins work on the site, that worker will read this HASP. Questions about the HASP will be answered by the SHSO. Alternatively, the contents of the HASP may be explained to the worker. When the worker and the SHSO are confident that the worker adequately understands this HASP, the worker will sign and date the affidavit in the front of this plan.

Each morning before work begins, the site supervisor will meet with all personnel and subcontractors under his direction and review relevant health and safety issues. The morning safety meetings will focus on the following items:

- the nature of the hazards associated with the work to be performed that day (i.e. the hazard analysis);
- the procedures that will be used to mitigate the hazards; and
- the emergency response plan.

The morning safety meeting, including the items discussed, will be documented in the site log book.

7. PERSONAL PROTECTIVE EQUIPMENT

7.1 Overview

This section of the HASP describes personal protective equipment (PPE) required to be worn by facility personnel. All equipment for each level of protection is mandatory except snake chaps and hearing protection. Snake chaps are to be worn by personnel working outside in overgrown or brushy areas. Hearing protection may be required if the action levels for noise described in Section 7.3.3 are exceeded. The proposed definitions of levels of protection are presented in Section 7.2.

7.2 Levels of Protection

7.2.1 Overview

This section of the HASP describes the various levels of personal protection that will be worn at the site. The levels of protection will vary according to the proposed work task that will be performed on the site. Furthermore, the levels of protection may be modified if appropriate site monitoring indicates that the potential for exposure is either less or greater than expected. Levels B, C, and D personal protective equipment is described in the following sections. It is anticipated that most of the site investigation work will be performed in either Level D or Level C. However, some tasks, where the potential for exposure or the potential chemicals of concern are not known, will require Level B during the initial investigations. Level B conditions can only be modified by real-time site monitoring information that indicates less potential for exposure than that required by Level B protection.

Workers must also follow the LCP policy for PPE, which is included in Appendix A, *LCP Mercury Hygiene Program* and *Required Personal Safety Equipment* brochures.

7.2.2 Level B Personal Protective Equipment

Level B will be used when the maximum degree of respiratory protection is needed (i.e., when unknown chemicals of concern, or concentrations, exist during a task). The minimum equipment requirements for Level B are as follows:

- pressure-demand, full-facepiece self-contained breathing apparatus (SCBA) or pressure-demand, supplied-air respirator with escape SCBA;
- chemical-resistant coveralls (polyethylene-coated Tyvek™ or equivalent);
- gloves: outer, chemical-resistant (nitrile or equivalent);
- gloves: inner, chemical-resistant (latex or equivalent);
- boots: chemical-resistant, steel toe (polyvinyl chloride (PVC), polyurethane, or equivalent);
- snake chaps (if required);
- hearing protection (if required); and
- hard hat.

7.2.3 Level C Personal Protective Equipment

Level C will be selected when the concentration and type of airborne hazardous substances is known and the criteria for selection of air-purifying respirators are met. The minimum equipment requirements for Level C are as follows:

- disposable coveralls and booties (Tyvek™ or equivalent): all joints must be taped;
- gloves: chemical resistant (nitrile or equivalent);
- boots, steel toe;
- snake chaps (if required);
- hearing protection (if required);
- hard hat;
- safety glasses with side shields; and
- half-face (or optionally, full-face) air purifying respirator with appropriate cartridges (cartridges to be changed when the cartridge window changes color).

7.2.4 Level D Personal Protective Equipment

Level D is to be selected when no respiratory hazards exist. The minimum equipment requirements for Level D are as follows:

- disposable coveralls (Tyvek™ or equivalent);
- gloves (nitrile or equivalent);
- boots, steel toe;
- snake chaps (if required);
- hearing protection (if required);
- hard hat; and
- safety glasses with side shields.

Level D will be the standard work uniform. Modified Level D can be designated when respiratory protection is not required and can include the use of Tyvek™ suits, nitrite gloves, etc. when general dust or dirty conditions exist.

7.3 Reassessment of Protective Program

The level of personal protection will be subject to change pending the results of on-site air monitoring (see section 10). However, in no case will PPE be reduced when unknown conditions exist at the site. Recommended action levels for airborne hazardous substances (i.e., organics and heavy metals) and noise are described in Section 10.

7.3.1 Action Level for Organics

The action level for the detection of organics with a photoionization detector (PID) will be a reading of 5 ppm above background. If volatile

organic vapors in the work space exceed the PID action level, personnel will evacuate the work space until the organic vapors dissipate to below the action level. If necessary, fans or other engineering controls may be used to cause more effective dissipation of organic vapors.

If the 5 ppm action level on the PID is exceeded for more than 5 minutes in any hour or if fans are used, then the site supervision will direct that the operation be conducted in Level C PPE. The air monitor action level at which Level C work must be stopped is any reading above 25 ppm on the PID, or readings above 5 ppm that last more than 50 percent of the work time. The calculations justifying the Level C action level are presented in Appendix A to this HASP.

7.3.2 Action Level for Mercury

The action level for mercury vapor is a concentration on the chemical detection tube exceeding 0.05 mg/m^3. This action level is the OSHA time weighted average (TWA) exposure limit. The level of mercury vapor that is immediately dangerous to life and health (IDLH) is 28 mg/m^3. If the action level for mercury vapor is exceeded, the work area will be evacuated until the vapor is dissipated. Fans may be used to aid in the dissipation of mercury vapor. The use of fans requires that Level C PPE (with HEPA filters) be worn.

7.3.3 Action Levels for Noise

Noise levels are to be determined by a sound level meter, which must conform, as a minimum, to the American National Specification Standard for Sound Level Meters, S1.4 (1971) Type S2A and which must be set to use the A-weighted network with slow meter response. Daily (8 hour)

permitted noise levels are mandated by OSHA regulation 29 CFR Part 1910.95.

The action level for any exposure to noise is 140 dBA. Above this level, instantaneous damage to hearing occurs. If the noise exceeds 140 dBA, workers must immediately reduce the noise level (shut-down or slow-down the source) and don noise protective equipment which will reduce the maximum sound levels to less than 140 dBA such that the threshold limit value (TLV) does not exceed 115 dBA averaged over 30 seconds and 85 dBA averaged over 8 hours.

Likewise, noise exposures exceeding 115 dBA averaged over 30 seconds and/or 85 dBA averaged over 8 hours require that hearing protection meeting the above requirements be used.

7.4 Work Mission Duration

During activities that require Level C PPE, all personnel will, at a minimum, take breaks according to the following schedule:

- 15 minute break mid-morning;
- 30 minute break at lunch; and
- 15 minute break mid-afternoon.

More frequent breaks will be recommended if any workers show symptoms of heat stress (Section 4.3.3).

7.5 Chemical Resistance and Integrity of Protective Material

It is not expected that long-term contact with concentrated hazardous substances will occur during this project. Therefore, protective equipment should primarily serve to protect against occasional contact and splashes of low concentrations of hazardous waste. If, however, elemental mercury is found in visible quantities, more protective suit and glove material will be required. According to manufacturer's specifications, only Saranex™ and Barricade™ are recommended for mercury protection. These materials also provide protection against PCBs.

7.6 Inspection

The SHSO, or designate, will routinely inspect all PPE and monitoring equipment to ensure that it is in good operating condition. Monitoring equipment will be tested and calibrated daily. Any concerns regarding the condition of PPEs or monitoring equipment will be evaluated immediately by the SHSO or designate.

8. SITE CONTROL MEASURES

8.1 Overview

In order to effectively contain hazardous materials within the work site, work zones will be established with specific policies to control entry into the work site and allow decontamination of all personnel and equipment leaving the work site. This section explains the site control measures to be used at the work site.

8.2 Work Zone Definition

Site control will be established and maintained by the use of work zones. The work zones consist of the exclusion zone, the contamination-reduction zone (CRZ), and the support zone. The exact location and extent of the work zones will be determined in the field by the site supervisor. Figure 8-1 (located at the end of Section 8) shows the proposed locations of the exclusion zone, CRZ, and support zone. The work zones will be modified as necessary as site investigation information becomes available.

8.2.1 Exclusion Zone

An exclusion zone will be established around the active work area while activities occur within the area. For example, while sampling the brine impoundments, the impoundment area will be delineated as the exclusion zone at the time of the sampling. This zone will extend beyond the work area a sufficient distance so that personnel and equipment may operate effectively without having to leave the exclusion zone. The exclusion zone will be designated with red plastic tape designed for the

purpose and which states that unauthorized entry is prohibited. All entry into and exit from the exclusion zone will be through the CRZ.

Entry into the exclusion zone is limited to those personnel who meet the requirements listed below:

- training and medical monitoring requirements established in Sections 5 and 6 of this HASP;
- wearing the appropriate level of personal protective equipment as established in Section 7 of this HASP;
- must have a need to be in the exclusion zone; and
- must adhere to the decontamination procedures established in Section 9 of this HASP.

8.2.2 Contamination-Reduction Zone (CRZ)

A CRZ will be established in an area that is contiguous with the exclusion zone. The CRZ will consist of the decontamination area. The CRZ will be established daily, along with the exclusion zone, be flagged in yellow and will be based upon the planned activity. When the daily activities involve multiple and non-contiguous locations, an all-encompassing CRZ will be established to minimize the need for decontamination between work areas. All entrance into and exit from the exclusion zone will be through the CRZ. The CRZ is limited to personnel who are authorized to enter the exclusion zone.

8.2.3 Support Zone

The support zone consists of all areas of the work site that are not part of an exclusion zone or the CRZ. The following activities will take place in the support zone: (i) automobile parking; (ii) supply and equipment storage; (iii) rest breaks; (iv) training meetings; and (v) observation of activities by personnel who do not meet the requirements for entering the exclusion zone, as described in Section 8.2.1.

DECONTAMINATION ZONES LAYOUT

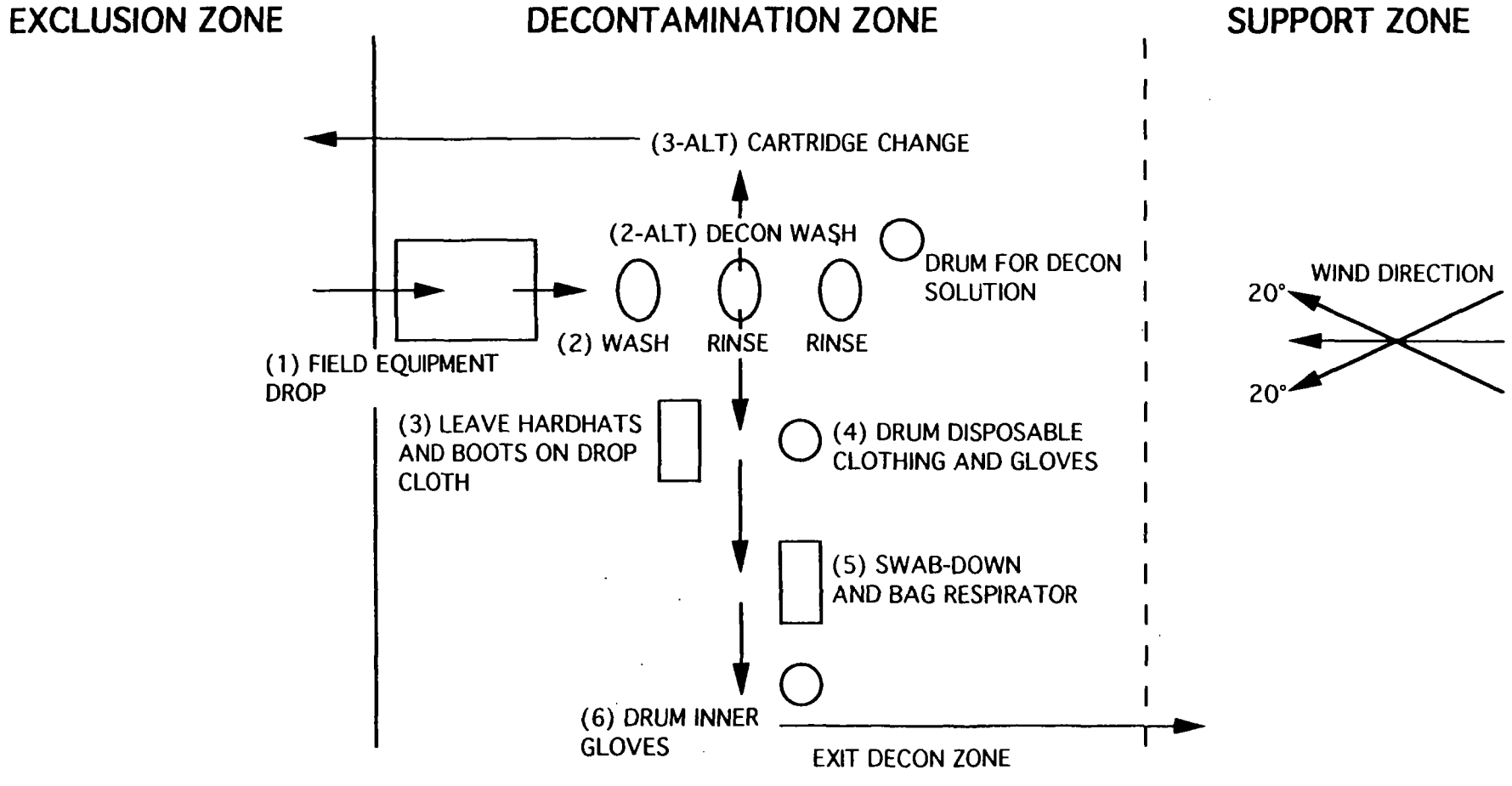


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FIGURE NO.	8-1
PROJECT NO.	GE 3582-02
DOCUMENT NO.	GA940493
FILE NO.	

9. DECONTAMINATION PLAN

9.1 Overview

Decontamination of personnel and equipment will take place during site investigation and removal actions to prevent the spread of contamination into clean zones, and to reduce exposure to other personnel and the environment. The personnel and equipment areas for decontamination will be clearly marked. This section of the HASP presents the decontamination procedures to be used throughout the duration of the project.

9.2 Standard Operating Decontamination Procedures

9.2.1 Introduction

Hazardous substances must be removed from all personnel and equipment before leaving the exclusion zone. The procedures for performing decontamination are described in this section. The following procedures are discussed in this section: (i) personal decontamination; (ii) equipment decontamination; and (iii) disposal of decontamination wastes.

9.2.2 Personal Decontamination

All personnel will decontaminate themselves whenever leaving the exclusion zone. Decontamination will occur in the CRZ. Personal decontamination will consist of the following procedures:

- travel to the decontamination line;
- wash boot covers and outer gloves;

- rinse boot covers and outer gloves;
- remove tape if worn and dispose;
- remove disposable coveralls by rolling down and dispose;
- remove boot covers and dispose;
- remove outer gloves and dispose;
- wash and rinse inner gloves;
- remove eye and/or respiratory protection;
- wash respirators in disinfectant solution and dispose of cartridges;
- allow respirator to air dry;
- wash the face, hands, and other exposed body areas; and
- wash the hard hat or wiped with a wet towel.

9.2.3 Equipment Decontamination

All equipment will be decontaminated when it is removed from the exclusion zone. Decontamination of equipment will take place in the CRZ. Sampling and monitoring equipment will generally be washed with water and detergent. Accumulation of petroleum residue may require the use of hexane to clean the equipment. More specialized decontamination procedures may need to be used in specific cases, and will be evaluated on a case-by-case basis. Larger equipment (i.e., backhoes) will be

decontaminated first by cool water, low pressure rinse combined with brush scrubbing. If necessary, this will be followed by a high pressure, hot water rinse.

Following decontamination, all equipment will be inspected by the site supervisor or designate. The decontamination will be considered complete when the reasonable decontamination procedures have been followed and the site supervisor observes no visible evidence of remaining contamination.

9.2.4 Disposition of Decontamination Wastes

Decontamination waste includes used wash water, clods of soil or waste that are removed from equipment, and miscellaneous refuse such as disposable coveralls, gloves, and paper towels. Used wash water will be processed through the on-site waste water treatment plant. Miscellaneous refuse will be drummed. Management of decontamination wastes will be the responsibility of the site owner/operator.

10. FREQUENCY AND TYPES OF AIR MONITORING/SAMPLING

10.1 Overview

Air monitoring will be performed, as dictated by the known or suspected chemicals of concern for a given work area, one or more of the following categories:

- organic vapors;
- mercury vapor; and
- dust.

Monitoring will be conducted in the breathing space of the workers. Air monitoring data will be entered in the site health and safety log book. This will include calibration data and all readings collected. Two types of air monitoring will be undertaken: (i) direct reading; and (ii) air sampling. The direct-reading measurements will be used to evaluate local and immediate hazardous situations. Air sampling will be used to characterize the specific constituents present and to predict which constituents might pose a hazard for future operations at the site, specifically the removal action.

10.2 Direct-Reading Monitoring Instruments

10.2.1 Organic Vapor Monitoring

Organic vapors will be monitored using a photoionization detector (PID) suitable for detecting the volatile organic vapors. For the purposes of discussion, it is assumed that the PID will be an HNu with a 10.2 or 11.7 electron-volt (ev) lamp, a Photovac MicroTip, or equal.

The PID will be calibrated using isobutylene calibration gas. Monitoring will be conducted in the breathing space of on-site personnel. Action levels for organic vapor monitoring are discussed in Section 7.3.1.

Instructions for the PID that is to be used will be maintained on site by the site supervisor. The site supervisor must also ensure that all personnel who are assigned to operate the PID are properly trained according to the procedures in the equipment instructions. The PID will be calibrated each morning before use for the day, or more often if recommended by the equipment instructions or if the accuracy of the readings becomes suspect. All calibrations will be recorded in the site log book.

10.2.2 Mercury Vapor Monitoring

The LCP facility has an established mercury monitoring system in place for the cell buildings. This system will continue during work in the cell rooms. For work done in other areas likely to contain mercury, direct monitoring with a Model 511 Gold Film Mercury Vapor Analyzer or equivalent will occur. Action levels for mercury vapor are discussed in Section 7.3.2.

As for the PID, instructions for the mercury vapor analyzer(s) will be on file with the site supervisor. All calibrations will be recorded in the site logbook.

10.2.3 Dust Monitoring

An aerosol monitor, Mini-Ram Model PDM (or equivalent), will be used to identify the level of total dust particulates on a real-time basis for

those activities where dust will be generated (i.e., during excavation activities). Action levels for dust are as follows:

- 0 to 10 mg/m^3 above background in the breathing zone: Level D (if no other constituents are anticipated); and
- greater than 10 mg/m^3: Level C (if no other constituents are anticipated).

The measurements of dust particulates will be adequate to document potential exposures to heavy metals in soil. Dust control (i.e., spraying water) will be implemented as deemed necessary by the SHSO. Instructions for the aerosol monitor will be on file with the site supervisor. Calibrations are to be recorded in the site logbook.

10.3 Site Air Monitoring and Sampling Program

10.3.1 Overview

Air sampling will be done for specific constituents of concern at the test pits. Air sampling will be used to evaluate the level of PPE required for further work at the facility. Dependent on constituent concentrations, workers may be able to downgrade from Level B to Level C protection during excavation activities. There will be two types of air sampling: (i) metals; and (ii) organic compounds, which are described in the following sections.

10.3.2 Metals Sampling

Air will be sampled at sites thought to have high concentrations of mercury, lead, and/or barium. Samples will be taken during trenching

operations to establish the airborne concentrations of metals that might be expected during removal actions at these sites. Sampling will not be necessary for soil or sediment collection activities. The metals sampling will be in addition to the real-time mercury monitoring.

The procedures for metals sampling is detailed in Section 4.2.7.3 of the Quality Assurance Project Plan (QAP) for this project.

10.3.3 Organic Sampling

Bulk organic samples will be taken during trenching operations. One sample per work area will be collected. This information will be used to provide a qualified evaluation of the organic compounds present as well as the concentrations to be expected if further excavation is necessary.

The sampling procedures for organic compounds in air are detailed in Sections 4.2.7.1 and 4.2.7.2 in the QAP.

11. SITE HEALTH AND SAFETY STANDARD OPERATING PROCEDURES (SOPs)

11.1 Overview

This section gives details on standard safety guidelines to follow during all work tasks.

11.2 Buddy System

When participating in work activities at the LCP site, workers will use the buddy system. Each worker will be observed by one or more other workers for signs of problems. Buddies should stay close together and must maintain visual contact. Responsibilities of workers utilizing the buddy system include:

- providing assistance to the buddy;
- observing the buddy for signs of chemical or heat exposure;
- periodically checking the indicator on the buddy's respirator cartridge;
- periodically checking the integrity of the buddy's PPE; and
- notifying site personnel if emergency assistance is needed.

11.3 Site Communications Plan

11.3.1 Internal Communication

The ability to communicate hazards to site personnel and the SHSO will be available at each active work site. This will include:

- an air horn for notifying site workers of an emergency situation (emergency signals are presented in the following paragraph); and

- a two-way radio for contact with the SHSO or designate.

Emergencies at the facility are signalled by five short blasts on the plant air horn or air whistle, depending on the location of the emergency (see Section 10.1.2). The all-clear signal is two long blasts. These signals be preserved for all emergencies. Each active work site will have an air horn available.

Radios should be fully charged each night and tested each morning. Radios will remain on the frequency designated by the SHSO at all times. Air horns should be tested periodically to determine if the horn is functioning properly.

11.3.2 External Communication

The telephone installed at the LCP facility will be the means of off-site communication. Any emergency or need of assistance by off-site personnel will be handled with this telephone. Daily inspection that the telephone is in good working order and periodic contact with off-site supervisors is essential.

11.4 Nearest Medical Assistance

The closest hospital to the site is the Southeast Georgia Regional Medical Center. This hospital is located approximately 2 mi (3 km) from the site on the corner of Parkwood and Kemble streets. Take Ross Road south to 4th Street. Turn left on 4th and continue to Kemble Street. Turn right on Kemble, hospital is 3 blocks on the left. Figure 11-1 shows the route to the hospital. This figure will be posted at various locations around the site.

HOSPITAL LOCATION PLAN

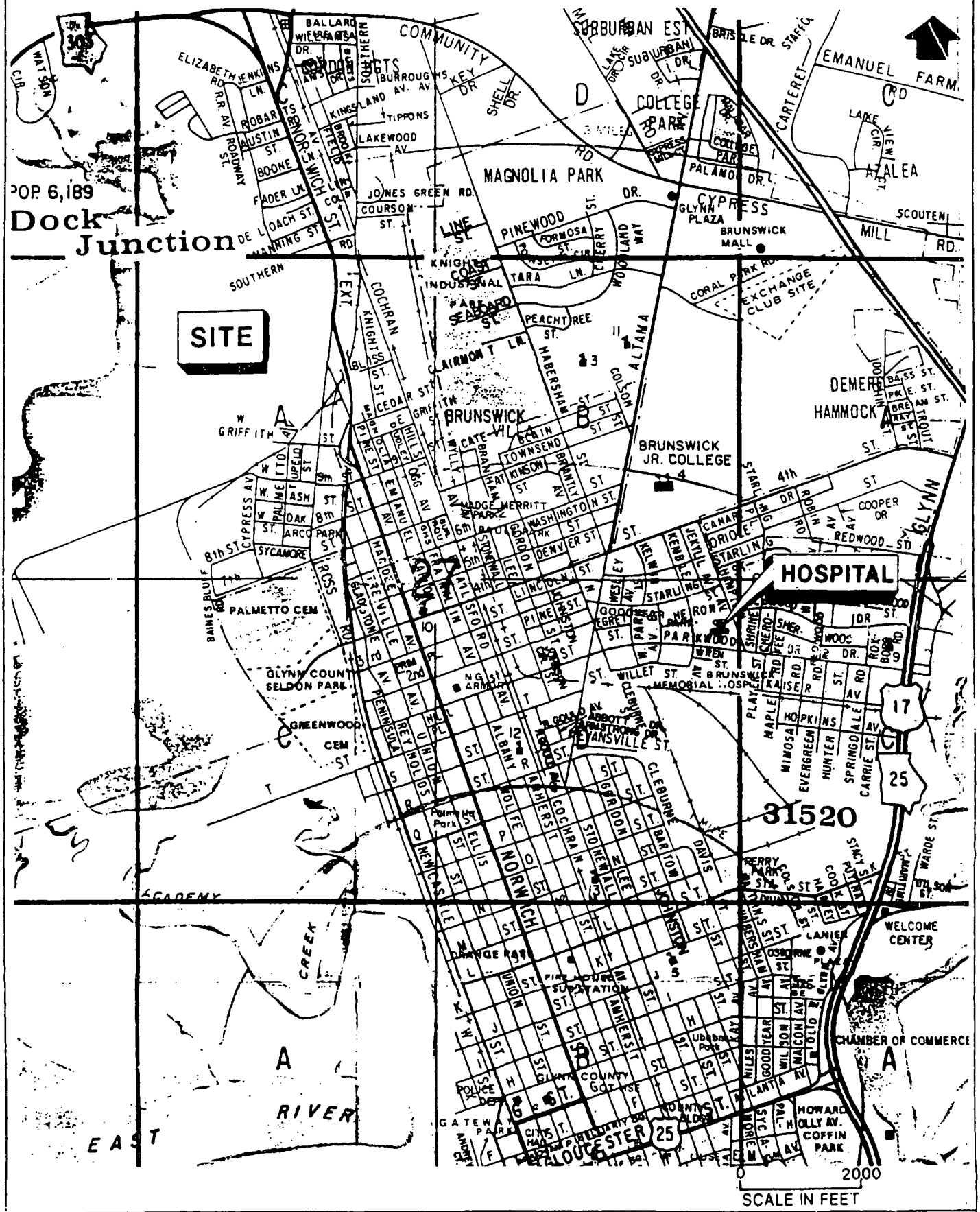

FIGURE NO.	11-1
PROJECT NO.	GE3582-02
DOCUMENT NO.	GA940493
FILE NO.	DF

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12. EMERGENCY RESPONSE/CONTINGENCY PLAN

12.1 Overview

In addition to the standard work practices, the emergency response and contingency plan applies to all personnel at all times and for all sites throughout the life of the project. This section outlines: (i) pre-emergency planning; (ii) personnel roles; (iii) evacuation and emergency procedures; and (iv) emergency equipment and facilities. The LCP Chemicals-Georgia Emergency Response/Action Plan is included in Appendix A.

12.2 Pre-Emergency Planning

Three general types of emergencies are possible in association with this project: (i) medical emergencies due to injury or illness of project personnel; (ii) hazardous substance releases from the facility; and (iii) hazardous waste releases from the work area.

12.2.1 Medical Emergencies

The site supervisor will prepare for medical emergencies before beginning work on the site by doing the items listed below:

- driving to the nearest hospital from the work site verifying the travel route;
- locating and testing the nearest telephone to the work site;
- ensuring that there is an adequately supplied first-aid kit available;

- ensuring that there is an adequate supply of cool, potable water in order to be used in the prevention and treatment of heat injury;

- ensuring that there are adequate facilities for washing-off hazardous wastes that may come in contact with personnel, which includes ensuring that there is an adequate supply of potable water to be used for washing;

- ensuring that there are adequate fire extinguishers available and that those extinguishers are fully charged;

- performing a reconnaissance of evacuation routes from the work site in the event of a general, facility-wide release of a hazardous substance; and

- ensuring that all key personnel on the site are adequately trained.

Safety showers and eye wash stations are located throughout the facility. It is the responsibility of the SHSO to check that each station is in working order, or properly identify non-working stations and provide alternative facilities (if necessary).

12.2.2 Hazardous Waste Releases from the Plant

The plant formerly produced chlorine gas and hydrogen chloride vapor. Both of these substances pose significant hazards. Presently, some product may remain stored on site or as residuals in vessels and piping. The potential for an emergency release is extremely low due to the fact the facility is no longer in production of these substances, and the quantities remaining on site are minimal. Nevertheless, the potential

for an emergency release event will be considered. Pre-emergency planning for such releases will consist of the following.

- The site supervisor will review the two LCP emergency response documents attached to this HASP:
  - Emergency Response / Action Plan; and
  - Contingency Plan and Emergency Procedures.

- The site supervisor, in consultation with the facility representative will establish and reconnoiter evacuation routes from the work site.

- The site supervisor will instruct all site personnel as to the procedures to be followed in the event of a release from the plant.

With respect to this project, the salient points of the LCP emergency response documents are as follows.

- Releases of chlorine gas or hydrogen chloride vapor are of direct significance to this project. Of the two, a release of chlorine is of by far the greater concern.

- The signal for general, plant-wide alert is five short blasts, repeated, on the air horn at the gate house.

- The signal for a local release inside the plant is five short blasts, repeated, on the air whistle at the scale house.

- The all clear signal is two long blasts on the air horn or on the whistle.

- Respiratory protection for gases which could be released will be readily accessible in all parts of the facility.

- In the event of an alert, personnel that happen to be in the plant area will evacuate to either the gate house or to the shift foreman's office, whichever is upwind.

12.2.3 Hazardous Waste Releases from the Work Site

Due to the nature of the hazardous wastes known to exist on the LCP property, it is possible that work operations will create a release that will constitute an emergency. If a release occurs which is immediately threatening, the site must be evacuated as per Section 12.5. The site will then be monitored for the resumption of safe working conditions.

12.2.4 Standard Safety Equipment

The site supervisor will ensure that the following emergency response equipment is available at each active work site:

- a first-aid kit;

- a fire extinguisher of the ABC type with at least a 20-pound rating;

- a properly filled and prepared eyewash device; and

- a cooler of ice water with an adequate supply of paper cups.

12.3 Personnel Roles and Lines of Authority

The USEPA OSC is the final authority regarding safety procedures at the site. On-site supervisors for specific tasks must coordinate safety procedures with the SHSO. Workers should address safety concerns and report safety-related issues to their site supervisor, who will then report to the SHSO. Of course, ultimately, the health and safety for project personnel lies with the individual.

12.4 Evacuation Routes/Procedures

In the event of a release of hazardous substances, personnel in the work site will evacuate along pre-established evacuation routes to pre-established evacuation areas. The evacuation areas and routes will be established by the site supervisor in consultation with the facility representative before project work begins. These routes will be established with consideration of the criteria listed below:

- the release may be from the railroad tank cars parked on the tracks east of the work site;
- the release may be from one or more investigative or removal operations; and
- the direction of the wind and the location of the release (see Figure 12-1 (at the end of Section 12) for a wind rose for the Brunswick area).

In the event that an unexpected waste is encountered and released in such a way as to threaten the health and safety of the workers, the environment, or other personnel, the following procedures will be used:

- the area surrounding the release will be evacuated to a safe distance until the nature of the release can be evaluated;
- the procedures for a medical emergency will be followed if necessary;
- the fire department will be called to conduct any emergency response work; and
- the notification procedures described in Section 12.5 will be followed.

12.5 Emergency Contact/Notification System

In the event of an emergency, the site supervisor or his designee is required to notify the following officials as soon as is reasonably possible:

- the SHSO;
- the facility representative;
- the project manager; and
- the project coordinator.

12.6 Emergency Medical Treatment Procedures

In the event of a medical emergency, personnel will call the 911 emergency hotline in Brunswick and summon an ambulance. The emergency hospital for the Brunswick area, and the closest hospital to the site,

is the Southeast Georgia Regional Medical Center. This hospital is located approximately 2 mi (3 km) from the site on the corner of Parkwood and Kimble streets. Before work on the site begins, the site supervisor should reconnoiter the route to the hospital.

12.7 Fire or Explosion

If possible without placing site workers in jeopardy, small fires may be extinguished utilizing fire extinguishers. Site workers should not attempt to extinguish fires that are too large or out of control. The local fire department will be called for assistance if the site workers cannot extinguish the fire. Notification will include any other hazards that the fire department should be aware of when they respond.

Prior to initiating the project, the SHSO will contact the Chief of the Brunswick Fire Department. The SHSO will brief the Fire Chief on the proposed activities that will be conducted at the LCP site and the potential hazards.

Following an explosion, first-aid should be administered to injured personnel provided that action does not endanger other personnel. If a fire results from the explosion, fire-fighting procedures should be the same as described above.

12.8 Spill or Leaks

Spills or leaks of mercury may be possible at the facility. LCP has a standard operating procedure for responding to spilled mercury within the plant, which is outlined below:

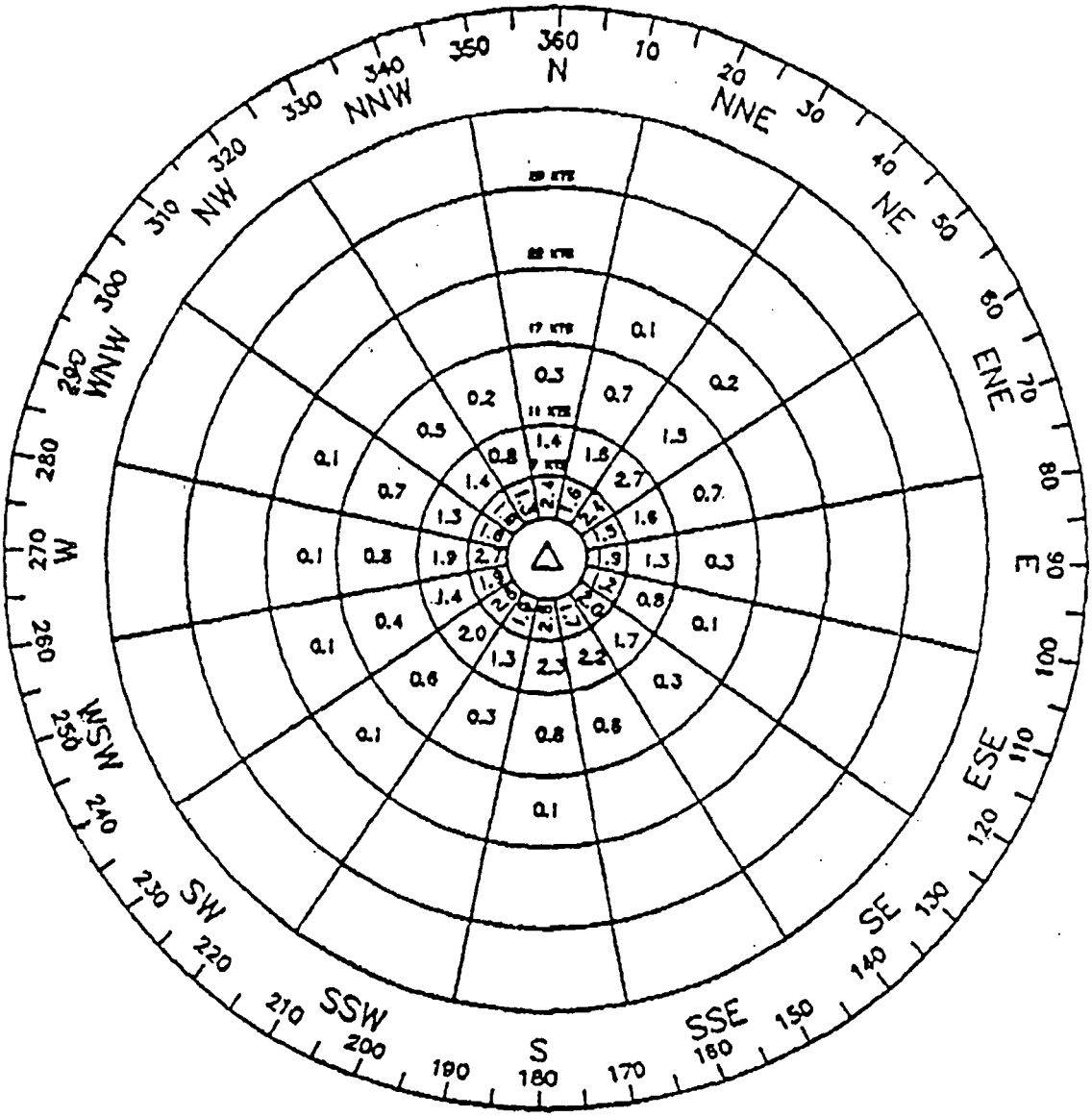
- for any mercury spill or leak, take immediate steps to correct or contain it;
- spilled mercury should be recovered immediately; and
- if mercury is found, isolate the source.

If spills occur outside of the cell rooms, mercury might contaminate the ground (concrete or soil). The ground in the vicinity of the spill must then be treated as hazardous waste.

12.9 Emergency Equipment/Facilities

In the case of an emergency, first aid and fire extinguishers will be available at each work site. There will also be a method of communicating information to the SHSO. Any other equipment and facilities will be provided by municipal emergency response teams.

WIND ROSE DIAGRAM



SOURCE: GLYNN COUNTY AIRPORT COMMISSION

EXPLANATION: RADIAL SECTORS INDICATE DIRECTION FROM WHICH WIND BLOWS. CONCENTRIC SECTORS INDICATE WIND SPEED. CONCENTRIC CATOGORIES ARE 7 KNOTS, 11 KNOTS, 17 KNOTS, 22 KNOTS, AND 29 KNOTS.NUMBERS INDICATE PERCENT OF OBSERVATIONS WITHIN A GIVEN RANGE OF SPEED AND DIRECTION. DATA BASED ON 197, 619 OBSERVATIONS COLLECTED BETWEEN 1945 AND 1972.

Δ = CALM (17.9 PERCENT)

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FIGURE NO.	12-1
PROJECT NO.	GE3582
DOCUMENT NO.	GA940493
FILE NO.	

13. CONFINED SPACE ENTRY PROCEDURES

13.1 Overview

The procedures for confined space entry as detailed below are based upon the procedure developed by LCP for operations at this facility. These procedures are consistent with the OSHA confined space standard (i.e., 29 CFR 1910.146).

13.2 Definitions

Within the scope of this procedure, confined spaces are defined as all spaces, open or closed, in which hazardous gases might accumulate or where a deficiency of oxygen could occur. This includes all tanks, tank trucks, blow cases, receivers, vats, tubs, hoppers, bins, boilers, kilns, or other similar vessels; as well as stacks, chimneys, sewers, trenches, pits, manholes, etc. more than five feet deep.

13.3 General Provisions

The SHSO must always know when people are working in confined spaces. To this end, the following procedures must be followed to keep all safety personnel aware of the situation.

- No employee is to enter any confined space without a written confined space entering permit having been executed. This permit will be initiated by the SHSO. It must be signed by the SHSO, the site supervisor, and the individual performing the atmospheric tests. The Watcher and each man entering the confined space must also sign the confined entry permit. The signatures will indicate the understanding of the rules as

outlined on the back of the permit, and serve as verification that these rules are being followed. Confined space entry permits will be numbered consecutively.

- The confined space entry permit will only be valid for a single shift. On jobs requiring more than a single shift to bring to completion, a new permit shall be issued at the start of each shift, when the new personnel arrive on the job and before the confined space is entered.

- The properly executed permit shall be displayed at the job site.

- Confined space entering at any time other than the normal day shift of a normal work day should be avoided. When it is necessary to enter a confined space at non-normal work times, it must be approved by the SHSO. Before any such authorization is given, the SHSO must be satisfied that there will be adequate and competent assistance available in the event of an emergency.

- It will be the primary responsibility of the site supervisor initiating the permit to see that all safety conditions and practices continue to be met during the work.

13.4 Procedure for Confined Space Entry

The following rules apply to all confined spaces unless specific variations have been submitted to the SHSO and approval has been granted in writing.

- On sites where flammable vapors may be present, all sources of ignition must be removed.

- All fuses or safety jacks must be pulled, switches tagged-off and locked-out with multiple locks on agitators, pumps, or any other electrically driven equipment. Belts must be removed on multiple line shaft driven equipment.

- Confined spaces, including jackets and other inter-connecting equipment, are to be cleaned by washing, neutralizing, and purging as much as possible to eliminate all noxious poisonous or flammable material, gases, or vapors.

- All direct chemical, steam pipe, treating agent, and exit lines must be blanked or removed. Where this is not possible, double block valves with a bleed between the blocks. Check for charging chute openings.

- Confined spaces must be tested for flammable vapors, toxic gases, and oxygen deficiency in that order, as applicable. Water must be tested for neutrality where the formation of hydrogen gas is possible. No confined space will be entered where the oxygen content is less than 19.5 percent unless self-contained breathing equipment is used.

- A constant source of fresh air, introduced in such a manner as to ensure a complete air change, must be provided.

- Men working in the confined space must be under the constant observation of a competent Watcher outside the confined space. The Watcher should be trained in first aid procedures in the event that rescue becomes necessary. The Watcher must be dressed in the same PPE as the men in the confined space. A formal Watcher procedure is detailed in Section 13.5.

- There must be sufficient additional workers immediately available to effect a physical rescue if required. They must be trained and provided with the equipment to remove a person from the confined space. Such equipment must be available at every entry point. The protective clothing requirements of OSHA regulations must be used in all cases of confined space entry.

- Every person entering any confined space shall wear a rescue harness or wristlets. In every confined space where the space must be entered through a manhole or the space is deeper than a man's shoulders, the life line must be attached.

- When a ladder is required to enter a confined space, the ladder must be made secure and must not be removed while anyone is inside the confined space.

- Adequate illumination must be provided. Approved low voltage, and intrinsically safe illumination must be employed.

- Additional equipment at the job site must include extra rope, harnesses, wristlets, and respiratory equipment with an independent air supply.

- All electrical equipment to be used inside the confined space must be in perfect condition and properly grounded and protected.

- All welding equipment used in the confined space must be provided with quick shut-offs under control of the Watcher.

- Only the working end of welding or burning equipment connected by wires or hoses will be taken into the confined space. The

gas cylinders or welding machine will be left outside of the confined space and properly blocked if on wheels.

- A properly executed Confined Space Entering Permit must be displayed at the job site.

- On all "hot work" inside a confined space, a properly executed welding and burning permit must be completed and in evidence at the job site.

- When gas welding or cutting is suspended for an indefinite period of time, the gas supply is to be cut off at the cylinders and the torch removed from the tank.

13.5 Confined Space Observer (Watcher)

Men working inside a tank must be under the constant observation of a fully instructed Watcher. Before anyone enters the confined space, the Watcher will be instructed by the SHSO regarding the following points.

- A valid confined space entry permit must be on the job.

- A rescue harness or wristlets must be on the job.

- The Watcher must know the location of the nearest emergency telephone number, safety shower, fire extinguisher, and radio.

- The Watcher must be able to describe exactly the location where the entry is taking place.

- For all "hot work" inside a confined space, the Watcher must be instructed on how to shut down welding and burning equipment.

- As long as anyone is inside the confined space, the watcher must remain in continuous contact with the worker. The Watcher is not to leave the job site except to report an emergency.

- Under no circumstances should the Watcher enter the confined space. If the worker(s) in the confined space become ill or injured, the watcher is to go to the nearest telephone and call 911, clearly describe what has happened and where the emergency is. The Watcher is to be sure the message is repeated back correctly before hanging up the telephone.

- The Watcher still does not enter the confined space. He returns to the space and directs the rescue squad to the emergency.

- If at all possible, the Watcher should contact workers in the immediate area and have them help direct the rescue squad to the emergency.

After being instructed in his responsibilities, the Watcher will sign the permit, indicating his understanding.

14. SPILL CONTAINMENT PROGRAM

The LCP facility has a mercury spill containment procedure already in place (Section 12.8). The facility is configured to handle mercury spills within the cell buildings and loading areas. As no liquid hazardous materials in any quantity are anticipated to be found outside of the cell buildings, no special spill containment program is deemed necessary. If any liquid waste is encountered, the site manager should provide enough commercially available absorbent material to recover the waste. The area of transfer of the waste to its final container at the site should be covered in plastic.

15. HAZARD COMMUNICATION

The SHSO will establish a hazard communication program to ensure that site workers are fully informed of all known hazardous chemicals on the site. The hazard communication program will comply with the OSHA requirements in 29 CFR 1910.1000. The program will include a list of all known hazardous substances on site as well as Material Safety Data Sheets (MSDSs), or the equivalent, for each chemical. Appendix 2 includes the MSDSs for substances known to exist at the LCP facility MSDSs for other chemicals thought to be present at the site are available from the SHSO. The SHSO must also assure that each worker understands the hazards.

16. VISITORS

No visitor to the work site will be permitted beyond the Support Zone of the work site, i.e., they will not be permitted to enter either a CRZ or an Exclusion Zone, unless they have first met: (i) the mandatory health and safety training requirements for personnel set forth in Section 6 of this HASP and (ii) the medical surveillance requirements described in Section 5 of this HASP. Also, they must utilize all personal protective equipment (PPE) (see Section 7) specified in this HASP for the particular Exclusion Zone to be visited. Visitors will be required to sign a release form prior to entering the site.

APPENDIX A

LCP CHEMICALS - GEORGIA
SAFETY PROCEDURES

To: Kirk Kessler
From: Al Taylor
other procedure will follow!

LCP MERCURY HYGIENE PROGRAM

Clothing - Shoes - Showers - Locker Facilities

Each employee regularly assigned to work in the cell building will be furnished a daily change of coveralls (or shirt and trousers). Each employee, including supervision, must wear a clean set of clothing each day. Clothing will be laundered either at the plant location or sent out for laundering.

No company furnished clothing is permitted to be taken home for laundering or any other reason. This is to prevent the possibility of mercury contamination of the home and family members.

Employees are not permitted to leave the plant premises wearing cell building work clothing. Employees should shower and change into street clothes before leaving the plant.

Separate lockers will be provided for street clothes and work clothes. An employee removes mercury contaminated clothing on one side of the locker building, walks to the shower room and after showering enters the street clothes area for dressing before leaving the plant. Dirty clothes will be deposited en route to showers.

Each employee who works in the mercury cell building or is involved with mercury contaminated material is provided with sufficient time to shower before leaving the plant. Daily washing of the head and scrubbing of fingernails is recommended.

Work shoes or boots will be furnished to employees who work in the mercury cell building. The work shoes/boots are to be kept in the work clothes locker area of the locker building. The shoes/boots are not permitted to be stored in the clean clothes locker and are not to be taken out of the plant.

Food - Tobacco Products

No food, beverages or tobacco products are permitted in the mercury cell building or any area where mercury may be present at any time.

Personal Hygiene

Hands should be washed thoroughly before eating or smoking. Scrub hands with a scrubbing brush, especially cleaning under fingernails.

Respiratory Equipment - Air Purifying

Comfo II respirators should be washed following daily use and

more often during the shift if necessary depending on the job. Mersorb cartridge should be replaced when the cartridge "window" changes color. The "window" must be checked every 30 minutes when in use.

Respirators must be thoroughly inspected after every use. At least once a month a written record of inspection will be performed by Supervision.

Every plant employee will receive training on the use of the respirator at least annually along with a respirator fit test.

Unless engineering controls are functioning properly, Comfo II respirators are to be worn during the following jobs:

1) Cleaning cells
2) Cleaning up visible spilled droplets of mercury
3) Removing grids
4) Removing or working on end castings
5) Removing caustic headers
6) Removing mercury pumps
7) Working on hydrogen coolers
8) Operating mercury vacuum cleaner
9) Areas designated by Supervisor

Additional respirator areas will be designated following mercury sniffer tests that indicate an ambient air level above 0.05 mg/m^3. The areas will be marked by signs posted to notify personnel.

BEARD POLICY

Compliance with the proper use of respirators and gas masks is essential. Employees should be instructed that no facial hair is permitted within the sealing area of a respirator or gas mask.

Supervision is required to assure compliance through regular observation of personnel under their supervision. Employees are responsible for compliance with this policy as a condition of employment.

Personal Time Weighted Average Sampling

Personal monitoring of cell building employees will be performed every month. Breathing zone samples will be taken to determine compliance with the 0.05 mg/m^3 TWA OSHA permissible exposure limit and to determine the effectiveness of the engineering control program.

Samples will be sent to a certified industrial hygiene laboratory for analysis. Sampling results will be discussed with the cell

building employees and will be posted in a prominent location.

Urine Sampling

Each employee must submit a first elimination of the day urine sample for mercury analysis at least once a month or more often as requested. An employee may obtain an analysis at their request.

PROCEDURE FOR EMPLOYEES WITH ELEVATED URINE MERCURY VALUES

A level of 100 micrograms/liter (mcg/l) of mercury in urine will initiate an "Action Level" response comprised of the following:

> The employee's supervisor will review with the employee the urine sampling results, previous job assignments, work practices and the mercury hygiene program to determine the root cause for the mercury in urine level and to set a course of corrective action that will minimize future mercury exposure. A written report of the review will be completed by the supervisor. Employees above the Action Level will submit urine samples on a bi-weekly basis.

Urine mercury values that are greater than 200 micrograms/liter, corrected for specific gravity, on two consecutive 16 hour composite samples may represent an excessive plant exposure situation. In order to determine whether or not there has been an adverse effect from plant mercury exposure, an employee with such elevated values shall be evaluated by the plant designated physician.

The medical evaluation of such an employee should include the following:

1) Interim medical history
2) A neurological exam which includes:
   a) Physician examination concentrating on sensation, eye movements, gait and tremor.
   b) A complete urinalysis and quantitative urine protein test and creatinine.
3) A serum sample to be analyzed for creatinine.

If an abnormality is identified during this examination, a further evaluation to determine whether or not the effect is mercury related may be indicated. The content of this further evaluation will be determined by the examining physician, in consultation with the Duke University Occupational Health Service.

An employee with two consecutive elevated urine mercury values above 200 mcg/l shall be removed from mercury exposure until the urine mercury level has decreased to 100 mcg/l (corrected) or lower on two consecutive samples. This will be achieved by removing the employee from a mercury exposure area. The need for a follow-up medical evaluation of an employee prior to return to contaminated areas will be determined by the plant designed physician.

Housekeeping

The first objective is to prevent mercury spills. However, if they do occur the following are necessary.

1. Cover with water any mercury held in an open container or in a ditch. This serves as a mercury vapor deterrent.
2. Using low pressure water, hose any floor area holding mercury droplets to move the mercury to a sump where it can be covered with water until it can be removed. Mercury spillage is to be cleaned up immediately. Use of compressed air for cleaning of floors and equipment is prohibited.
3. Place a container under equipment to collect any mercury that may drop to the floor. Once mercury drops to the floor it breaks up into very small droplets that are difficult to remove from tiny cracks and crevices in the floor. Mercury leaks must be corrected on a first priority basis.
4. Use a mercury vacuum cleaner when possible to remove mercury from the floor or on equipment. The exhaust air of the vacuum cleaner must be properly filtered to prevent generation of air borne mercury concentrations.
5. Using low pressure water, hose off castings on denuders and electrolyzers to remove accumulated mercury.
6. Amalgam buckets are to be emptied and thoroughly washed immediately after use.
7. Mercury in open containers must be transferred to closed containers by the end of shift.
8. Floors in operator room should be scrubbed as required with bleach or mercury X solutions to reduce mercury in air concentrations below 0.05 mg/m^3.
9. Walls and other surfaces should be washed down on at least an annual basis and immediately following any major process venting such as a cell fire.

Ventilation

Fans used for exhausting or diluting mercury vapors will be kept in good condition and in run as necessary to keep mercury exposure below the permissible exposure level of 0.05 mg/m^3.

Welding - Burning - Cutting

Air line respirators shall be worn when burning, welding or cutting on mercury contaminated material.

Self-Contained Breathing Apparatus

Self-contained breathing apparatus are to be worn during emergency conditions.

Labels - Material Safety Data Sheets

Every container of mercury must have a proper mercury warning label permanently displayed. A Material Safety Data Sheet for mercury is to be kept in the cell building operators station for immediate review by cell building personnel. The MSDS is to be reviewed with employees at least annually with a written record of the meeting completed by supervision.

Mercury Sniffer Readings

A mercury sniffer reading should be taken daily to determine mercury air concentrations at all floor levels of the cell building. The readings should be used to determine a course of action for leak repairs, equipment replacement and to designate respirator areas. Signs must be posted at entrances to regulated respiratory protection areas where readings exceed 0.05 mg/m^3 mercury.

WHERE THE MERCURY LEVEL IS GREATER THAN 0.05 mg/m^3, THE PRIORITY TO FIX THE PROBLEM IS HIGHER THAN ANY PRODUCTION REQUIREMENT. Readings will be posted at the cell building operators desk for notification to the building employees.

Disposal of Mercury Contaminated Material

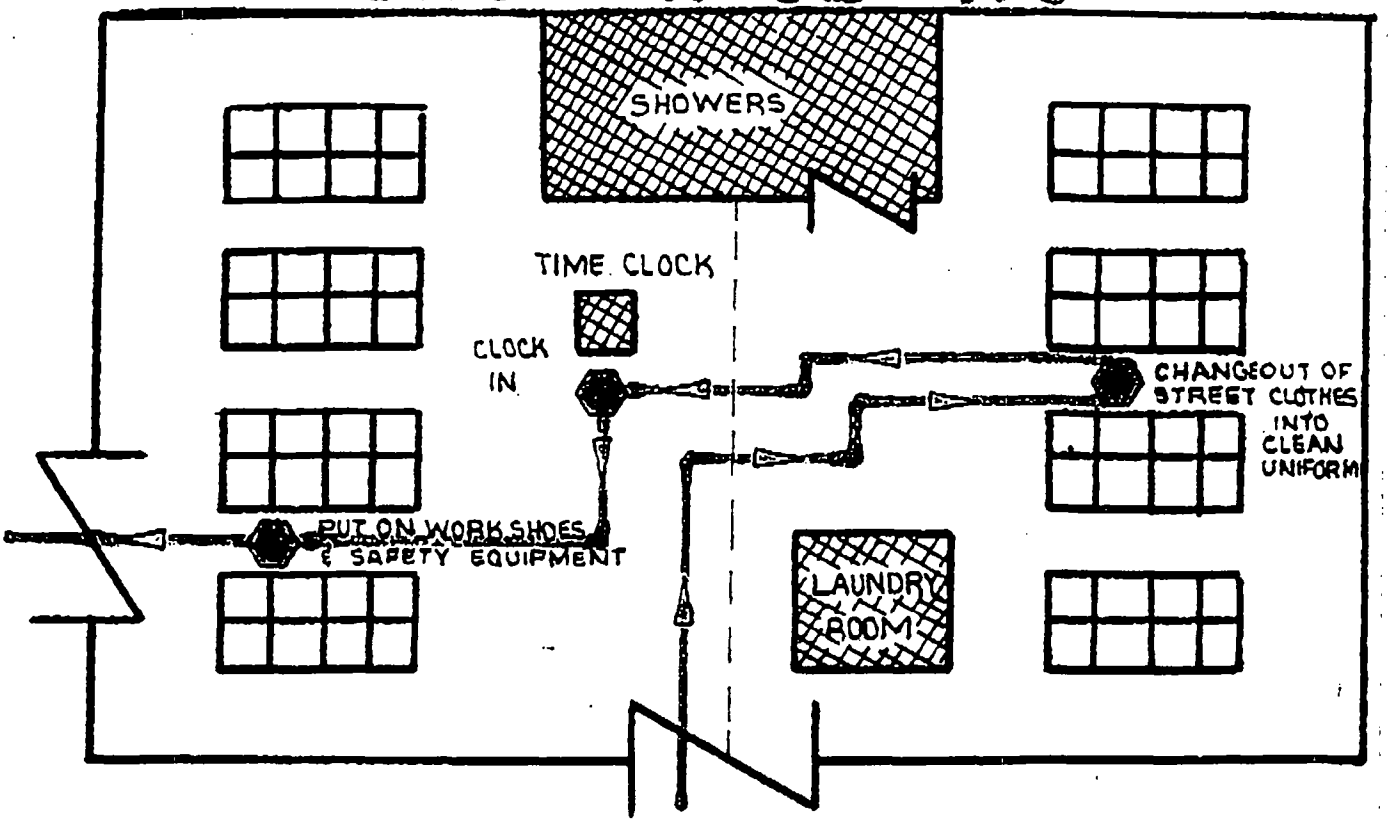
Paper towels, gloves, wipe cloths, paper coveralls, floor sweepings, rubber gaskets, floor cleaning mops and any other mercury contaminated material must be placed in a designated covered drum which will be handled as a mercury contaminated

hazardous waste and removed to an off site disposal facility. The drum must be properly labeled. Full drums cannot be stored at a designated plant site for more than 90 days.

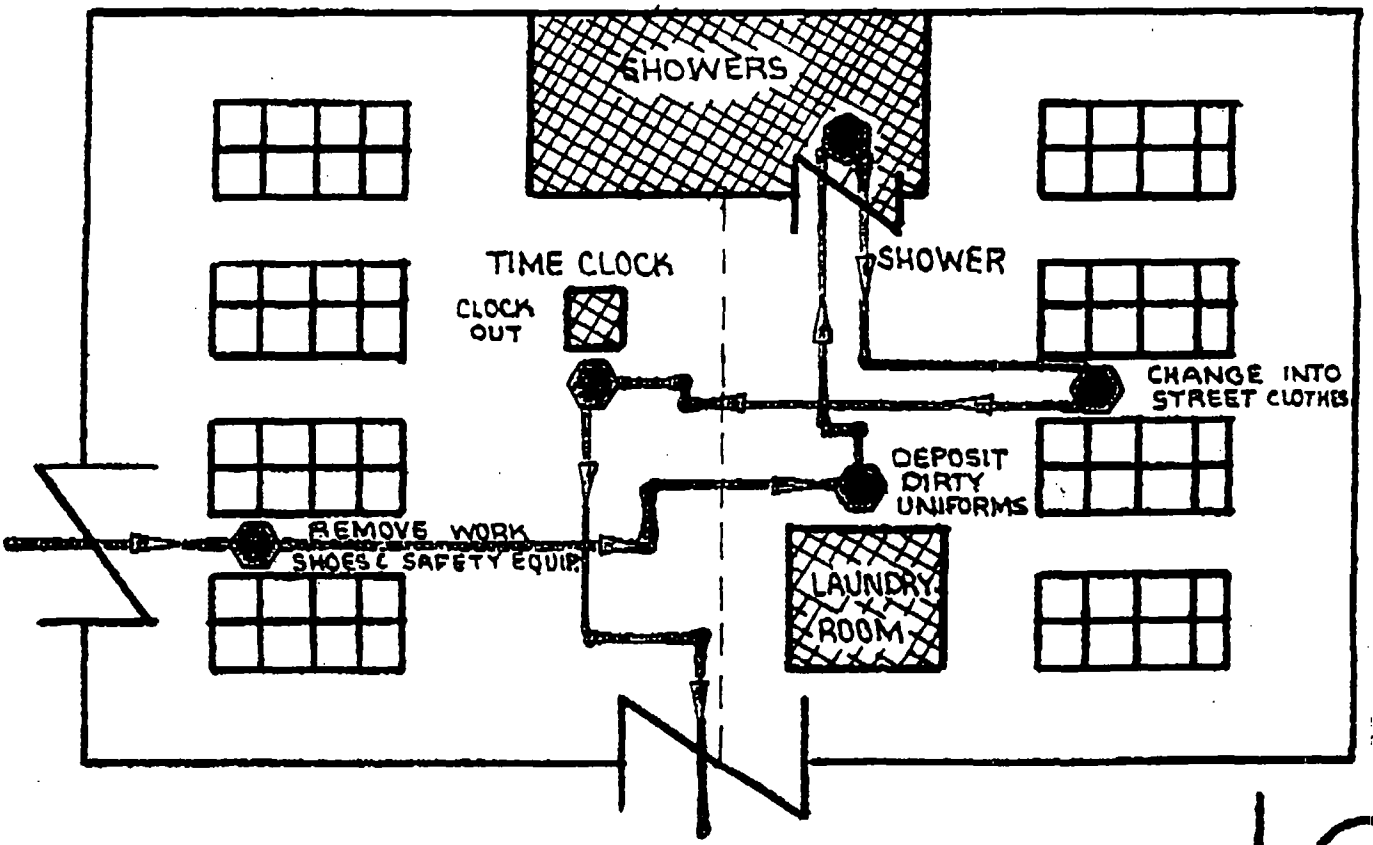
LCP PREGNANCY POLICY

No female of child bearing capability will be allowed to work in the cell buildings or other areas where mercury vapors are present above 0.05 mg/m^3.

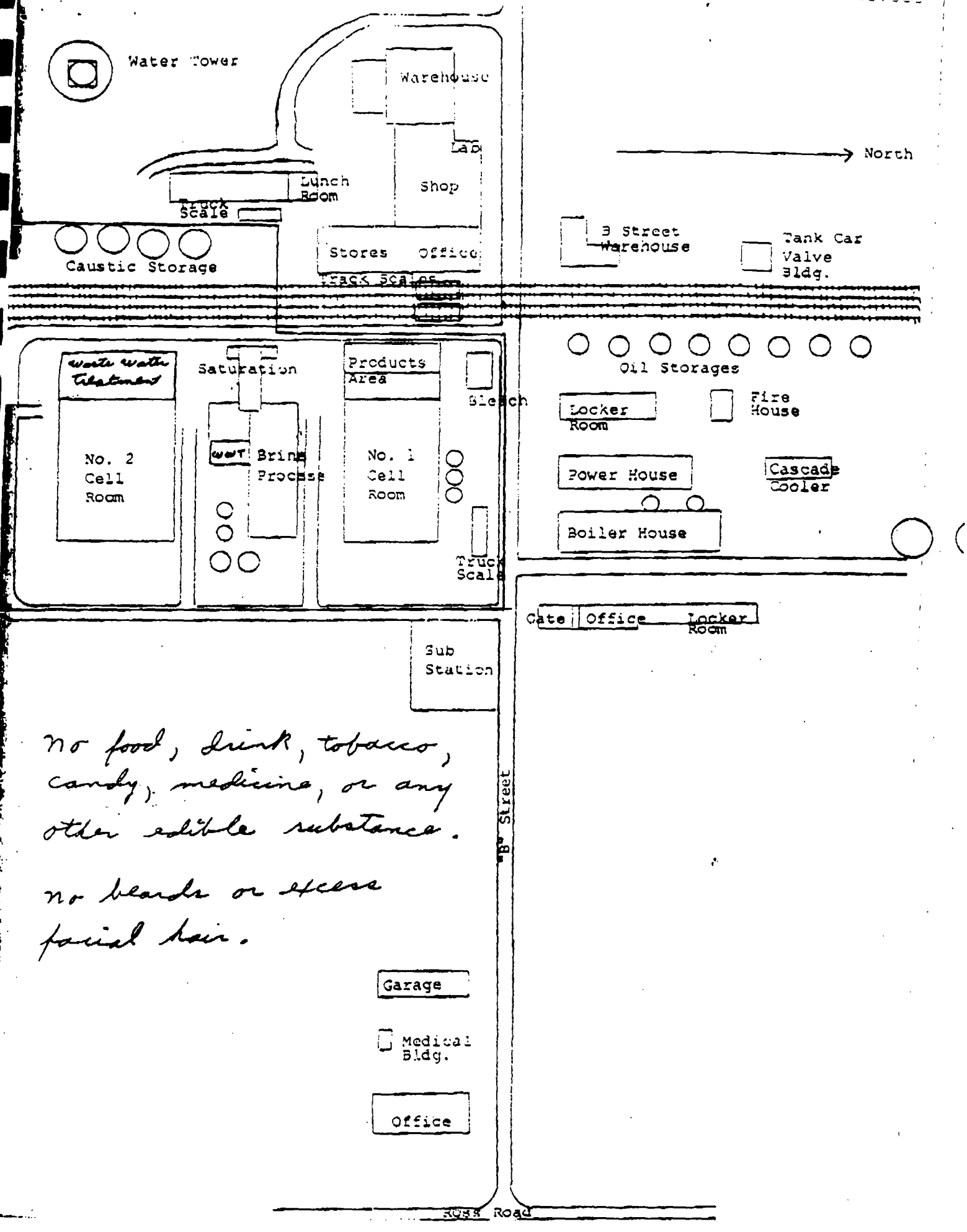
CLOCKING IN



CLOCKING OUT

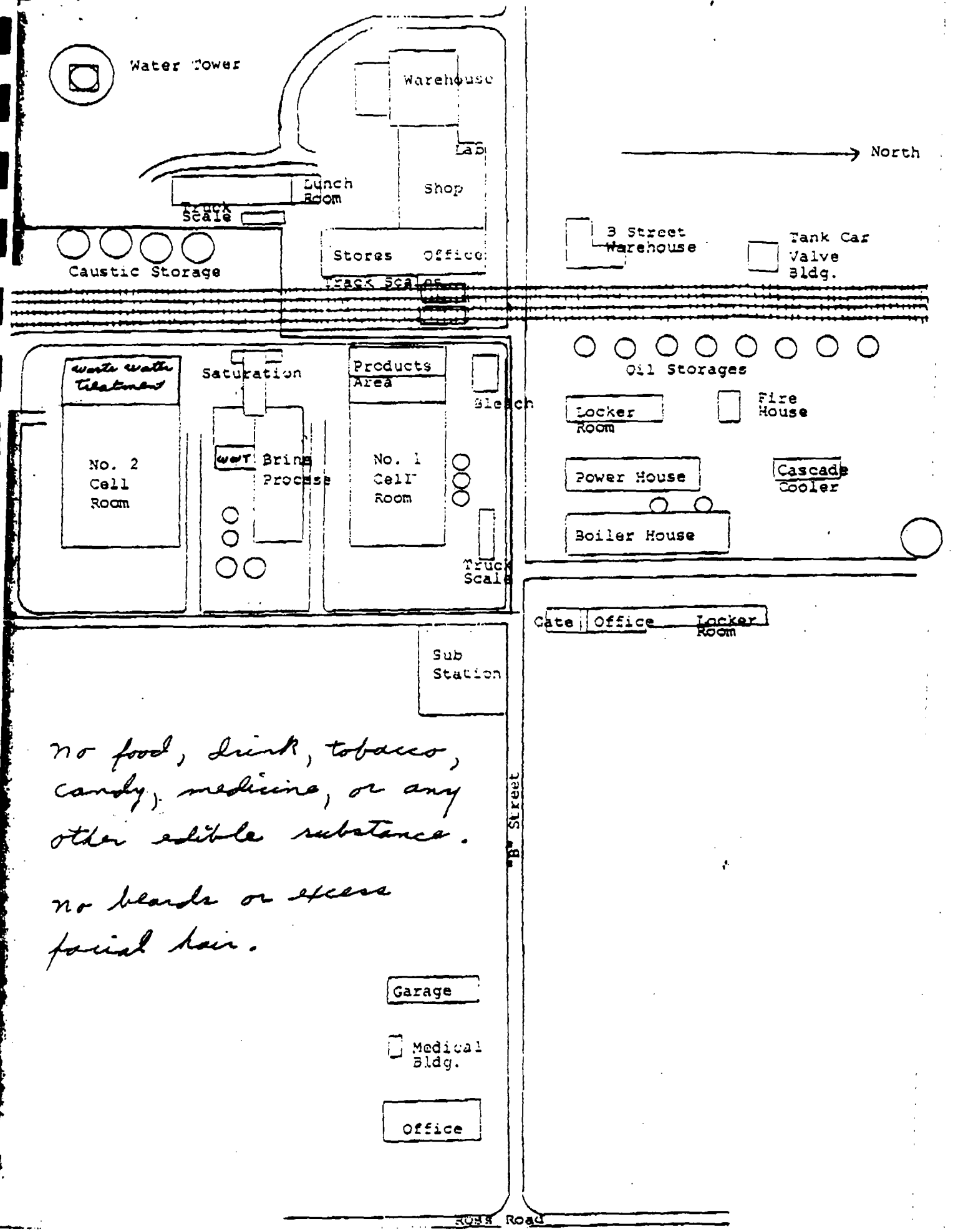


LCP



no food, drink, tobacco, candy, medicine, or any other edible substance.

no beards or excess facial hair.



no food, drink, tobacco, candy, medicine, or any other edible substance.

no beards or excess facial hair.

MERCURY RECOVERY

The cell systems in this plant contain more than 400,000 pounds of mercury of which at least 95% is moving at all times. Due to routine cell work and unavoidable leaks, some mercury will be spilled. Our problem is two-fold. We must keep the spillage to an absolute minimum, and we must recover the spilled mercury immediately.

Below are listed standard operating procedures for mercury handling:

1) Any time there is a mercury leak, take immediate steps to correct it or contain it.

2) When spilled mercury is found, recover it immediately. If it is of sufficient quantity, pick it up; if not, wash it into the ditches where it can be recovered from the traps.

3) When removing amalgam, take every precaution from spilling mercury. Wash down after dipping.

4) Run wash water into the amalgam dump pot only when dumping amalgam. A continuous flow of water over the amalgam in the pot on the bottom floor will carry droplets of mercury with it.

5) Keep the lids on the pump well and pump end wash chambers closed at all times.

6) Check the bottom floor of the cell rooms a minimum of twice per shift. If mercury is found, determine where it came from and take necessary action to correct the situation and clean the mercury up.

7) A daily mercury inspection will be made in the cell rooms--both upstairs and downstairs--normally done on the 11-7 shift by shift Cell Operations Leader. The results of this inspection will be recorded on forms BK-420 and BK-421.

Periodic inspections will be made to insure that all possible action is being taken to prevent the loss of mercury.

MERCURY HYGIENE IN INDUSTRIAL CHEMICALS

I. Mercury and How It Affects You!

1) Mercury is a poisonous, silver-white metal which is a liquid. It vaporizes at a temperature as low as 10°F. This means that the colorless, odorless vapor is formed when mercury is heated in production processes; and it may be present in the air anywhere mercury is used because it vaporizes at room temperature.

2) The most common cause of industrial mercury poisoning is inhaling or breathing mercury vapor. On a lesser scale, mercury poisoning can result from eating foods that have been contaminated with mercury or its compounds, smoking contaminated tobacco, or from careless handling of contaminated objects. The mercury can enter man's system through contact with the skin, where it's absorbed through the hair follicles and sweat glands.

3) There are namely two kinds of mercury vapor poisoning: acute (short-term exposure) and chronic (long-term exposure). The symptoms of acute poisoning include: tightness and pain in the chest, difficulty in breathing, inflammation of the mouth and gums, fever, and headaches. Acute poisoning is rare in industry, but it can result from accidental exposure to mercury or its compounds. Much more common among workers is chronic poisoning--caused by long-term exposure to lower levels of mercury. The symptoms include: inflammation of mouth and gums, weakness, increase in saliva, loss of appetite and weight, and impaired digestive and kidney functions. The effects of mercury poisoning on the central nervous system often show up as

tremors, or shaking, particularly in the hands. Other mercury poisoning signals are: personality changes--irritability, temper outbursts, excitability, shyness, indecision.

II. Controlling Mercury Exposure

1) Effective control to prevent harmful exposure to mercury contamination requires an awareness of the potential health hazards, knowledge of the workplace and practices, and continuing effective preventive measures (e.g. through good housekeeping to control accumulation of mercury in workplace, through good personal hygiene--to prevent contamination of clothing, food and tobacco products).

2) Respirators of the cartridge or canister type that are specially designed for mercury are to be used for low or moderate concentrations. High concentrations require the use of supplied air respirators. Caution is advised in the use of canister-type respirators, since mercury vapor or dust doesn't have any smell and consequently provides no warning when the respirator is no longer giving effective protection. If a mercury vapor meter is not on hand, a good common sense attitude applies as to whether the area has low, moderate, or high mercury vapor concentration.

3) In any workplace, all equipment containing mercury should be properly maintained to prevent escape of mercury liquid, vapor, or dust. Areas where mercury is used should be kept separate from other work areas where possible and restricted to those workers directly involved in the mercury operations.

4) Sweeping the floor should be avoided because it creates dust and breaks the mercury into even smaller particles that can vaporize more quickly. Similarly, compressed air should not be used to blow mercury off equipment or clothes, because it can disperse mercury throughout the work area.

5) Employees should wash their hands with soap thoroughly before eating or smoking, have regular urinalyses, change work clothes and shoes daily, shower and change into street clothes before going home.

III. Reporting Effects of Mercury Exposure

1) Any evidence of an employee suffering from disturbances of the digestive system or kidney function, oral hygiene problems, and undue irritability should be brought to the immediate attention of the supervisor.

2) Although such symptoms may not actually be due to mercury poisoning, there is the possibility of excessive exposure; and the worker should be examined by a doctor to determine if this has occurred.

IV. Workers' Responsibilities

Personnel involved or associated with using mercury should be aware of the health and safety problems and should follow the general rules given as well as other safety rules issued to protect him on the job.

1) Be aware of the use of mercury in your work area.

2) Report accidental spills or contamination of materials with mercury to the supervisor.

3) Abide by instituted precautions--use all safety equipment when specified by the company, such as respirators and protective clothing.

4) Have periodic check by urinalysis. Submit urine sample promptly.

5) Change into special work clothes at work. After work, thoroughly shower and change into street clothes.

Monsanto

Monsanto Company
800 N. Lindbergh Boulevard
St. Louis, Missouri 63167
Phone: (314) 694-1000

June 10, 1992

Mark Kamilow
Allied Signal, Inc.
P. O. Box 1139
Morristown, NJ 07962-1139

Dear Mr. Kamilow:

I am enclosing the information we discussed, including recent articles which review the known and published health effects studies and reports related to polychlorinated biphenyls (PCBs). I hope these will help to answer your questions.

PCBs have been extensively studied over the past 20-25 years, and reports and studies are constantly being reviewed by scientists and physicians. The enclosed review articles were prepared fairly recently by well-known and respected scientists who have considerable knowledge and expertise in PCBs. I will comment briefly on each to help point out sections that are pertinent to questions you asked, and that summarize large amounts of technical data and information in general terms that the average person can relate to.

1. PCBs: Is the Cure Worth the Cost? A report by the American Council on Science and Health, 1987.

This booklet is an excellent review of the significant PCB health effects literature up to about 1985-86. The references are listed in detail, should you like more specific information. ACSH is a volunteer organization of respected scientists and physicians throughout the U.S. who review all types of health issues (see pg. 19 for a sample). These scientists are affiliated with the most prestigious universities, medical colleges, hospitals, and scientific institutes in the country and are not employed by industry.

This booklet focuses upon the persons most heavily exposed for the largest periods of time - occupationally exposed workers and persons ingesting large quantities via fish in the diet.

In summary, extensive studies by government agencies (NIOSH) and others have found no statistically significant evidence of "ill health effects" including cancer, cardiovascular, and neurological ills (pgs. 9, 10).

2. "Polychlorinated Biphenyls" How Do They Affect Human Health?" Renate D. Kimbrough, Health and Environment Digest, 2, 1988, pgs. 1-3.

Dr. Kimbrough is an eminent scientist who first reported PCB health effects in rats in 1975. (See ACSH booklet reference list also). In this article, Dr. Kimbrough reviews the Yusho and Yu-Cheng incidents where humans actually ate contaminated food. Early reports in 1968 blamed PCBs for health effects in children, but as Dr. Kimbrough points out, these incidents have now been shown to have been caused by high concentrations of other contaminants, not PCBs.

Dr. Kimbrough summarizes on page 3...

"Thus, despite positive laboratory animal data and except for chloracne, exposure to PCBs has led to no convincing, clinically demonstrable chronic health effects in humans."

In September 1989 in Ann Arbor, Michigan at a scientific symposium re-evaluating PCB health effects sponsored by Michigan State University, U.S. EPA and the National Cancer Institute, Dr. Kimbrough re-affirmed this conclusion.

3. Monsanto Material Safety Data Sheet - Polychlorinated Biphenyls.

This document summarizes acute and chronic health effects, emergency first-aid procedures, personnel protective equipment recommendations, chemical and physical properties, and an array of information recommended by OSHA for worker information.

I hope this literature will be useful to you.

Sincerely,

Gary W. Mappes

Gary W. Mappes, Ph.D.
Product & Environmental Safety Manager

GWM:cm
Enclosures (3)

MONSANTO PRODUCT NAME

Polychlorinated Biphenyls (PCBs)

MONSANTO COMPANY
800 N. LINDBERGH BLVD.
ST. LOUIS, MO 63167

Emergency Phone No.
(Call Collect)
314-694-1000

Date: 10/88

PRODUCT IDENTIFICATION

Synonyms:

PCBs
Chlorodiphenyl (__% Cl)
Chlorinated biphenyl
Polychlorinated biphenyl
Chlorinated biphenyls
(approx. __% Cl)

Trade Names/ Common Names:

Aroclor®[1] Series 1016, 1221, 1232, 1242, 1248, 1254, 1260
Therminol®[1] FR Series

PYRANOL®[2] and INERTEEN®[3] are trademarks for commonly used dielectric fluids that may have contained varying amounts of PCBs as well as other components including chlorinated benzenes.

ASKAREL - Generic name for a broad class of fire-resistant synthetic chlorinated hydrocarbons and mixtures used as dielectric fluids that commonly contained about 30-70% PCBs. Some ASKAREL fluids contained 99% or greater PCBs and some contained no PCBs.

This list of trade names is representative of several commonly used Monsanto products (or products formulated with Monsanto products). Other trademarked PCB products were marketed by Monsanto and other manufacturers. PCBs were also manufactured and sold by several European and Japanese companies. Contact the manufacturer of the trademarked product, if not in this listing, to determine if the formulation contained PCBs.

[1] Registered trademark of Monsanto Company
[2] Registered trademark of General Electric Company
[3] Registered trademark of Westinghouse Electric Corporation

CAS No.'s: 001336363, 053469219, 021672296, 01109769, 011096825 and others

WARNING STATEMENTS

Federal regulations under the Toxic Substances Control Act require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be marked. (check regulations, 40 CFR 761, for details)

CAUTION
CONTAINS
PCBs
(Polychlorinated Biphenyls)

A toxic environmental contaminant requiring special handling and disposal in accordance with U.S. Environmental Protection Agency Regulations 40 CFR 761 For Disposal Information contact the nearest U.S. E.P.A. Office

In case of accident or spill call toll free the U.S. Coast Guard National Response Center 800 424-8802

Also Contact _____
Tel No _____

CAUTION —
CONTAINS
PCBs
(Polychlorinated Biphenyls)
FOR PROPER DISPOSAL INFORMATION
CONTACT U.S. ENVIRONMENTAL
PROTECTION AGENCY

PRECAUTIONARY MEASURES

Care should be taken to prevent entry into the environment through spills, leakage, use, vaporization, or disposal of liquid or containers. Avoid prolonged breathing of vapors or mists. Avoid contact with eyes or prolonged contact with skin. If skin contact occurs, remove by washing with soap and water. Following eye contact, flush with water. In case of spillage onto clothing, the clothing should be removed as soon as practical, skin washed, and clothing laundered. Comply with all federal, state, and local regulations.

EMERGENCY AND FIRST AID PROCEDURES

Ingestion: Consult a physician. Do not induce vomiting or give any oily laxatives. NOTE TO PHYSICIAN—If large amounts are ingested, gastric lavage is suggested.

Skin: If liquid or solid PCBs are splashed or spilled on skin, contaminated clothing should be removed and the skin washed thoroughly with soap and water. NOTE TO PHYSICIAN—Hot PCBs may cause thermal burns.

Eyes: Eyes should be irrigated immediately with copious quantities of running water for at least 15 minutes if liquid or solid PCBs get into them. A petrolatum-based opthalmic ointment may be applied to the eye to relieve the irritating effects of PCBs.

Inhalation: Remove to fresh air. If skin rash or respiratory irritation persists, consult a physician. NOTE TO PHYSICIAN—If electrical equipment arcs over, PCBs or other chlorinated hydrocarbon dielectric fluids may decompose to produce HCl, hydrochloric acid, a respiratory irritant.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Wear chemical splash goggles and have eye baths available where there is significant potential for eye contact.

Skin Protection: Wear appropriate protective clothing and chemical resistant gloves to prevent skin contact. Consult glove manufacturer to determine appropriate type glove for given application. Wear chemical goggles, face shield, and chemical resistant clothing such as a rubber apron when splashing is likely. Wash immediately if skin is contaminated. Remove contaminated clothing promptly and launder before reuse. Clean protective equipment before reuse. Provide a safety shower at any location where skin contact can occur. Wash thoroughly after handling.

ATTENTION! Repeated or prolonged contact may cause chloracne in some people.

Respiratory Protection: Avoid breathing vapor or mist. Use NIOSH/MSHA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical splash goggles. Consult respirator manufacturer to determine the type of equipment for a given application. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed. High airborne concentrations may require use of self-contained breathing apparatus or supplied air respirator. Respiratory protection programs must be in compliance with 29 CFR Part 1910.134.

Ventilation: Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits (see below). If practical, use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

Airborne Exposure Limits: Chlorinated biphenyl (approximately 42% chlorine)

OSHA PEL: 1 mg/m³ 8-hour time-weighted average - Skin*
ACGIH TLV: 1 mg/m³ 8-hour time-weighted average - Skin*
2 mg/m³ short-term exposure limit - Skin*

*Skin notation means that skin absorption of this material may add to the overall exposure. Avoid skin contact.

(OCCUPATIONAL CONTROL PROCEDURES continued on page 3)

OCCUPATIONAL CONTROL PROCEDURES *(continued)*

Airborne Exposure Limits (Continued): Chlorinated biphenyl (approximately 54% chlorine)

OSHA PEL: 0.5 mg/m³ 8-hour time-weighted average - Skin*
ACGIH TLV: 0.5 mg/m³ 8-hour time-weighted average - Skin*
1 mg/m³ short-term exposure limit - Skin*

*Skin notation means that skin absorption of this material may add to the overall exposure. Avoid skin contact.

FIRE PROTECTION INFORMATION

Fire and Explosion: PCBs are fire-resistant compounds. They may decompose to form CO, CO_2, HCl, phenolics, aldehydes and other toxic combustion products under severe conditions such as exposure to flame or hot surfaces.

At temperatures in the range of 600-650°C in the presence of excess of oxygen PCBs may form polychlorinated dibenzofurans (PCDFs). Laboratory studies under similar conditions have demonstrated that PCBs do not produce polychlorinated dibenzo-p-dioxins (PCDDs).

PCBs in electrical equipment have been reported to produce both chlorinated dioxins (PCDDs) and furans (PCDFs) during fire situations. These combustion products may result all, or in part, from non-PCB components of the dielectric fluids or other combusted materials. Consult the equipment manufacturer for information regarding composition of the dielectric fluids in electrical apparatus.

Standard fire fighting wearing apparel and self-contained breathing apparatus should be worn when fighting fires that involve possible exposure to chemical combustion products. Fire fighting equipment should be thoroughly cleaned and decontaminated after use.

Federal regulations require all PCB transformers to be registered with fire response personnel.

If a PCB transformer is involved in a fire-related incident, the owner of the transformer may be required to report the incident. Consult and follow appropriate federal, state, and local regulations.

REACTIVITY DATA

PCBs are very stable, fire-resistant compounds.

HEALTH EFFECTS SUMMARY

Skin Contact: PCBs can be absorbed through intact skin. Local action on skin is similar to that of common organic solvents where contact leads to removal of natural fats and oils with subsequent drying and cracking of the skin. A potential exists for contracting chloracne.

Eye Contact: The liquid products and their vapors are moderately irritating to eye tissues.

Ingestion: The acute oral toxicities of the undiluted compounds are: LD_{50} rats—8.65 gm/kg for 42% chlorinated, and 11.9 gm/kg for 54% chlorinated—"slightly toxic."

Inhalation: Animal experiments of varying duration and at different air concentrations show that for similar exposure conditions, the 54% chlorinated material produces more liver injury than the 42% chlorinated material.

(HEALTH EFFECTS SUMMARY continued on page 4)

HEALTH EFFECTS SUMMARY *(continued)*

Other:

There are literature reports that PCBs can impair reproductive functions in monkeys. The National Cancer Institute performed a study in 1977 using Aroclor 1254 with both sexes of rats. NCI stated that the PCB, Aroclor 1254, was not carcinogenic under the conditions of their bioassay. There is sufficient evidence in the scientific literature to conclude that Aroclor 1260 can cause liver cancer when fed to rodents at high doses. Similar experiments with less chlorinated PCB products have produced negative or equivocal results.

The consistent finding in animal studies is that PCBs produce liver injury following prolonged and repeated exposure by any route, if the exposure is of sufficient degree and duration. Liver injury is produced first, and by exposures that are less than those reported to cause cancer in rodents. Therefore, exposure by all routes should be kept sufficiently low to prevent liver injury.

Numerous epidemiological studies of humans, both occupationally exposed and non-worker environmentally exposed populations, have not demonstrated any causal relationship between PCB exposures and chronic human illnesses such as cancer or neurological or cardiovascular effects. PCBs can cause dermatological symptoms; however, these are reversible upon removal of exposure source.

PCBs are identified as hazardous chemicals under criteria of the OSHA Hazard Communication Standard (29 CFR Part 1910.1200). PCBs have been listed in the International Agency for Research on Cancer (IARC) Monographs (1987)-Group 2A and in the National Toxicology Program (NTP) Annual Report on Carcinogens (Fourth).

PHYSICAL DATA

PROPERTIES OF SELECTED AROCLORS*

PROPERTY	1016	1221	1232	1242	1248	1254	1260
Color (APHA)	40	100	100	100	100	100	150
Physical state	mobile oil	mobile oil	mobile oil	mobile oil	mobile oil	viscous liquid	sticky resin
Stability	inert	inert	inert	inert	inert	inert	inert
Density (lb/gal 25°C)	11.40	9.85	10.55	11.50	12.04	12.82	13.50
Specific gravity x/15.5°C	1.36-1.37 x-25°	1.18-1.19 x-25°	1.27-1.28 x-25°	1.30-1.39 x-25°	1.40-1.41 x-65°	1.49-1.50 x-65°	1.55-1.56 x-90°
Distillation range (°C)	323-356	275-320	290-325	325-366	340-375	365-390	385-420
Acidity mg KOH/g, maximum	.010	.014	.014	.015	.010	.010	.014
Fire point (°C)	none to boiling point	176	238	none to boiling point	none to boiling point	none to boiling point	none to boiling point
Flash point (°C)	170	141-150	152-154	176-180	193-196	none	none
Vapor pressure (mm Hg @ 100°F)	NA	NA	0.005	0.001	0.00037	0.00006	NA
Viscosity (Saybolt Univ. Sec. @ 100°F) (centistokes)	71-81 13-16	38-41 3.6-4.6	44-51 5.5-7.7	82-92 16-19	185-240 42-52	1800-2500 390-540	— —

NA—*Not Available*

SPILL, LEAK & DISPOSAL INFORMATION

Cleanup and disposal of liquid PCBs and other PCB items are strictly regulated by the federal government. The regulations are found at 40 CFR Part 761. Consult these regulations as well as applicable state and local regulations prior to any disposal of PCBs, PCB items, or PCB-contaminated items.

If PCBs leak or are spilled, the following steps should be taken immediately:

All non-essential personnel should leave the leak or spill area.

The area should be adequately ventilated to prevent the accumulation of vapors.

The spill/leak should be contained. Loss to sewer systems, navigable waterways and streams should be prevented. Spills/leaks should be removed promptly by means of absorptive material, such as sawdust, vermiculite, dry sand, clay, dirt or other similar materials, or trapped and removed by pumping or other suitable means (traps, drip-pans, trays, etc.).

Personnel entering the spill or leak area should be furnished with appropriate personal protective equipment and clothing as needed. See Occupational Control Procedures section of this MSDS.

Personnel trained in the emergency procedures and protected against the attendant hazards should shut off sources of PCBs, clean up spills, control and repair leaks and fight fires in PCB areas.

All wastes and residues containing PCBs (e.g., wiping cloths, absorbent material, used disposable protective gloves, clothing, etc.) should be collected, placed in proper containers, marked and disposed of in the manner prescribed by EPA regulations (40 CFR Part 761) and applicable state and local regulations.

Various federal, state and local regulations may require immediate reporting of PCB spills and may also define spill clean-up levels. Consult your attorney or appropriate regulatory officials for information relating to spill reporting and spill clean-up.

ENVIRONMENTAL INFORMATION

Care should be taken to prevent entry of PCBs into the environment through spills, leakage, use, vaporization or disposal of liquids or solids. PCBs can accumulate in the environment and can adversely affect some animals and aquatic life. In general, PCBs have low solubility in water, are strongly bound to soils and sediments, and are slowly degraded by natural processes in the environment.

ADDITIONAL COMMENTS

Polychlorinated Biphenyls

For regulatory purposes, under the Toxic Substances Control Act the term "PCBs" refers to a chemical substance limited to the biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contain such substance (40 CFR Part 761).

Chemically, commercial PCBs are defined as a series of technical mixtures, consisting of many isomers and compounds that vary from mobile oily liquids to white crystalline solids and hard non-crystalline resins. Technical products vary in composition, in the degree of chlorination and possibly according to batch.

The mixtures generally used contain an average of 3 atoms of chlorine per molecule (42% chlorine) to 5 atoms of chlorine per molecule (54% chlorine). They are used as components of dielectric fluids in transformers and capacitors. Prior to 1972, PCB applications included heat transfer media, hydraulic and other industrial fluids, plasticizers, carbonless paper, paints, inks and adhesives.

In 1972 Monsanto restricted sales of PCBs to applications involving only closed electrical systems (transformers and capacitors). In 1977 all manufacturing and sales were voluntarily terminated. In 1979 EPA restricted the manufacture, processing, use, and distribution of PCBs to specifically exempted and authorized activities.

REQUIRED PERSONAL SAFETY EQUIPMENT FOR LOADING SULFURIC ACID INTO TANK CARS OR TANK TRUCKS

The following personal protective equipment must be worn by the person engaged in the loading or unloading of SULFURIC ACID (ALSO KNOWN AS SPENT ACID OR FRESH ACID). This procedure applies to both tank cars and tank trucks.

1. Hard Hat
2. Goggles
3. Face Shield
4. Coat or Jacket Made of Rubber or Plastic
5. Pants Made of Rubber or Plastic
6. Rubber Safety Boots
7. Rubber Gloves
8. A Chemical Respirator Must Be Worn At Any Time Acid Fumes Are Present.
9. A Full Face Gas Mask May Be Substituted For Items 2, 3, and 8 Of The Above.

This procedure applies at all times that the loader is on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded. This procedure also applies to all other individuals (whether or not employed by LCP Chemicals) that are on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded.

Truck drivers do not need to wear personal protective equipment while in the cab of their truck.

REQUIRED PERSONAL SAFETY EQUIPMENT FOR LOADING CAUSTIC SODA INTO TANK CARS OR TANK TRUCKS

The following personal protective equipment must be worn by the person engaged in the loading or unloading of CAUSTIC SODA (ALSO KNOWN AS SODIUM HYDROXIDE). This procedure applies to both tank cars and tank trucks.

1. Hard Hat
2. Goggles
3. Face Shield
4. Coat or Jacket Made of Rubber or Plastic
5. Pants Made of Rubber or Plastic
6. Rubber Safety Boots
7. Rubber Gloves
8. A Chemical Respirator Must Be Worn If Fumes Are Present.

This procedure applies at all times that the loader is on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded. This procedure also applies to all other individuals (whether or not employed by LCP Chemicals) that are on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded.

Truck drivers do not need to wear personal protective equipment while in the cab of their truck.

REQUIRED PERSONAL SAFETY EQUIPMENT FOR LOADING BLEACH INTO TANK CARS OR TANK TRUCKS

The following personal protective equipment must be worn by the person engaged in the loading or unloading of **BLEACH (ALSO KNOWN AS SODIUM HYPOCHLORITE). This procedure applies to both tank cars and tank trucks.**

1. Hard Hat
2. Goggles
3. Face Shield
4. Coat or Jacket Made of Rubber or Plastic
5. Pants Made of Rubber or Plastic
6. Rubber Gloves
7. Rubber Safety Boots
8. A Chemical Respirator Must Be Worn When The Tank Dome Cover Is First Opened and Any Time Fumes Are Present.

This procedure applies at all times that the loader is on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded. This procedure also applies to all other individuals (whether or not employed by LCP Chemicals) that are on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded.

Truck drivers do not need to wear personal protective equipment while in the cab of their truck.

REQUIRED PERSONAL SAFETY EQUIPMENT FOR LOADING MURIATIC ACID INTO TANK CARS OR TANK TRUCKS

The following personal protective equipment must be worn by the person engaged in the loading or unloading of MURIATIC ACID (ALSO KNOWN AS HYDROCHLORIC ACID OR HCl). This procedure applies to both tank cars and tank trucks.

1. Hard Hat
2. Goggles
3. Face Shield
4. Coat or Jacket Made of Rubber or Plastic
5. Pants Made of Rubber or Plastic
6. Rubber Gloves
7. Rubber Safety Boots
8. A Chemical Respirator Must Be Worn When The Tank Dome Cover Is First Opened, When The Loading Lines and Boot Are Being Disconnected and Removed, and At Any Time Acid Fumes Are Present.
9. A Full Face Gas Mask May Be Substituted For Items 2, 3, and 8 Of The Above.

This procedure applies at all times that the loader is on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded. This procedure also applies to all other individuals (whether or not employed by LCP Chemicals) that are on the loading platform, on the tank platform, or in the immediate vicinity of the tank being loaded.

Truck drivers do not need to wear personal protective equipment while in the cab of their truck.

REQUIRED PERSONAL SAFETY EQUIPMENT FOR SERVICING CAUSTIC SODA TANK CARS

The following personal protective equipment must be worn by the person engaged in the inspection and servicing of tank cars used for CAUSTIC SODA (ALSO KNOWN AS SODIUM HYDROXIDE).

Servicing before loading:

1. Hard Hat
2. Goggles
3. Face Shield
4. Coat or Jacket Made of Rubber or Plastic
5. Pants Made of Rubber or Plastic
6. Rubber Safety Boots
7. Rubber Gloves
8. A Chemical Respirator Must Be Worn If Fumes Are Present.

This equipment is required during the opening, venting, cleaning, draining, or purging operation. It is also required while testing the steam coils or replacing components of the car. This equipment is also required while closing and sealing a car prior to shipment. This procedure also applies to all other individuals (whether or not employed by LCP Chemicals) that are engaged in these activities.

REQUIRED PERSONAL SAFETY EQUIPMENT FOR SERVICING CHLORINE TANK CARS OR TANK TRUCKS

The following personal protective equipment must be worn by the person engaged in the servicing of tank cars or tank trucks used for loading CHLORINE (ALSO KNOWN AS LIQUID CHLORINE).

1. Hard Hat
2. Safety Glasses or Goggles
3. Safety Shoes
4. A Full Face Gas Mask While Connecting Or Disconnecting Vent Lines Or When Opening Or Closing Valves On the Tank Or Vent Lines.
5. A Chemical Respirator While Leak Testing Loaded Chlorine Cars Or Air Padding Prior To Shipment.
6. Gloves

This procedure also applies to all other individuals (whether or not employed by LCP Chemicals) that are engaged in these activities.

LCP-21 REVISED 1-23-85

LCP CHEMICALS & PLASTICS, INC.

DISTRIBUTION: Plant Managers,
Corporate Safety and Hygiene Coordinator

DOCTOR CASE #: _____

OSHA RECORDABLE #: _____

LOST WORK DAY INJURY #: _____

ACCIDENT-NEAR MISS REPORT FORM

LOCATION: _____

1. Injured Employee: _____ Day Injury Reported: _____
2. Date of Injury: _____ Time: _____ Shift: _____ Day of Week: _____
3. Job Title: _____ Length of Time in Current Job: _____
4. Company Service: _____
5. Present Supervisor: _____ Length of Time with Present Supvr: _____
6. Last 2 Dr. Cases: _____ Last Safety Meeting: _____
7. What happened? _____
8. Where in the plant area did accident occur? _____
9. Description of injury: _____
10. Was employee seen by a physician? _____ Name: _____ Hospital Name: _____
11. What caused the accident? _____
12. Was there an unsafe act? _____ Was a safety rule or procedure violated? _____
    Was there an unsafe condition or operation? _____
    Did you personally review the occurence with the employee?
13. What immediate steps are being taken to prevent a recurrence of this accident? _____
14. What are the long term plans required to prevent a recurrence of this accident? _____

    Target completion date: _____ Follow-up responsibility by: _____

Doctor Cases: Report to be completed by Supervisor and Employee.
OSHA Recordable Cases: Report to be completed by Supervisor, Employee, and Department Head.
Lost Time Injury or Restricted Work Day Injury: Report to be completed by Supervisor, Employee, Department Head and Plant Manager.

SUPERVISOR: _____ DATE: _____

EMPLOYEE: _____ DATE: _____

DEPARTMENT HEAD: _____ DATE: _____

PLANT MANAGER: _____ DATE: _____

LCP CHEMICALS & PLASTICS, INC.

INCIDENT REPORT

(NOT TO BE USED FOR CASES INVOLVING WORKMEN'S COMPENSATION, OTHER PERSONAL INJURY OR DAMAGE TO PROPERTY OF OTHERS.)

DIVISION	LOCATION	REPORT NO.

TIME OF INCIDENT	DAY OF WEEK	MONTH	DAY	YEAR	HOUR A.M. P.M.	DATE AND TIME REPORTED A.M. P.M.

REPORTED BY	LOCATION OF INCIDENT

TYPE OF INCIDENT

- ☐ NEAR-MISS
- ☐ LOSS OF MATERIAL
- ☐ POTENTIAL HAZARD (FIRE, INJURY, ETC.)
- ☐ FIRE OR EXPLOSION
- ☐ CONTAMINATION OF MATERIAL
- ☐ ENVIRONMENTAL POLLUTION
- ☐ EQUIPMENT DAMAGE
- ☐ OPERATIONAL ERROR
- ☐ OTHER (EXPLAIN BELOW)

DESCRIBE INCIDENT (IF NECESSARY, USE SEPARATE SHEET):

RESULTS OF INCIDENT (EXPLAIN FULLY – DAMGE, LOSSES, ETC.):

BASIC CAUSE(S) (DESIGNATE ONE OR MORE CAUSES AND EXPLAIN FULLY – WHERE APPLICABLE, SELECT FROM LIST SHOWN ON REVERSE SIDE)

CORRECTIVE MEASURES TAKEN:

RECOMMENDATIONS FOR ADDITIONAL CORRECTIVE MEASURES:

COMPLETE THIS SECTION FOR REPORTING FIRES

DISCOVERED BY	TIME	PRIVATE ALARM BY	TIME

PUBLIC ALARM BY	TIME	PLANT BRIGADE RESPOND?	TIME

PUBLIC F.D. RESPOND?	TIME	TIME FIRE EXTINGUISHED	DATE SPRINKLER SYSTEM RETURNED TO NORMAL:	TIME

EQUIPMENT USED: HOSE LINES	EXTINGUISHERS	SPRINKLER HEADS OPENED

FOREMAN'S SIGNATURE	SIGNATURE OF SUPERVISOR OR DEPT. HEAD

THIS SIDE TO BE COMPLETED BY SAFETY SUPERVISOR AND/OR LOCATION EXECUTIVE.

CIRCLE NUMBER AS APPLICABLE

BASIC CAUSES

Based on statements and other details of investigation, consider whether the cause was due to an ACT of an employee, a CONDITION in the environment or a PERSONAL FACTOR inherent in any person involved.

UNSAFE ACT (100)

Where the cause was a specific action or lack of action by the individual which could be considered under the individual's control. (Generally carelessness, violation of safety rules, etc. would be considered unsafe acts unless specific criteria indicate a personal factor to be the cause.)

IMPROPER ATTIRE

11 Failure to Attire Safely – did not use (or misused) safety equipment available or required for use, or was inappropriately attired for the job conditions

SAFETY EQUIPMENT/DEVICES MISUSED

21 Lockout/Tag out
22 Testing devices – not used or misused
23 Making devices ineffective

IMPROPER PROCEDURE

31 Improper use of equipment
32 Unauthorized use of equipment
34 Failure to report a condition
35 Failure to heed a hazard
36 Failure to follow instructions or established procedure *(not involving misuse of safety equipment)*

UNSAFE ENVIRONMENT OR CONDITION (200)

Where the cause was a situation or event not controllable by the individual. (A condition causing a allergic reaction to some but not most employees should be considered a personal factor and not an unsafe condition.) Inadequate training or instruction should be considered a condition as opposed to a deficiency in skill or ability.

41 Inadequate safety attire prescribed, provided or available for use
42 Inadequate safety devices *(improperly or inadequately guarded or protected equipment)*
52 Inadequate training for the job
53 Inadequate supervision
70 Faulty construction, design, layout *(including lighting, ventilation, arrangement of facilities, etc.)*
71 Inadequate housekeeping/maintenance/inspection
72 Defective equipment
80 Unsafe act by another person
81 Upset condition such as fire, explosion, etc. or abnormal operation
82 Inclement weather *(wind, rain, snow, ice, etc.)*
90 Alleged Condition where repeated exposure could lead to physical impairment *(such as hearing loss from noise, pneumoconiosis from dust, vapors, etc.)*

PERSONAL FACTOR (Mental/Physical) (300

Where there is evidence of a deficiency in ability, physical condition or mental attitude; an uncontrollable factor inherent in the individual at the time of his injury or illness including allergy, fatigue, intoxication, temper, etc.

01 Deficiency in skill or ability
02 Physical handicap including allergic sensitivity, crippled, poor hearing or eyesight, obesity, inadequate strength or stamina for job requirement
03 Abnormal mental or physical state *(affected by medication, alcohol, narcotics, worry, fear, etc.)*
04 Fatigue from working overtime or working a second job
05 Other personal factor
06 Inadequate job experience

00 CAUSE UNKNOWN *(Use this "cause" only when the basic cause cannot be reasonably determined as an ACT, CONDITION, or PERSONAL FACTOR.)*

CORRECTIVE MEASURES

FACILITIES (500)

01 Change in Design
02 Add Rupture Discs, Blow-Offs, Vents
03 Alteration of Existing Equipment
04 Addition to Existing Equipment
05 Change of Materials
06 Change of Tools
07 Guard Addition or Improvement
08 Add Instruments
09 Change in Location or Arrangement
10 Repair of Equipment
11 Other

PROCESS-PROCEDURE (600)

01 Change in Job Method
02 Change in Operation Sequence
03 Change in Equipment
04 Housekeeping Improvement
05 Change in Time Work done
06 Change in Temperature or Pressure
07 More Frequent Inspection
08 Not fully Understood—must study
09 Safety Rule Revision
10 Protective Equipment Specified
11 Other

PERSONNEL (700)

01 Instruction
02 Re-instruction
03 Job Transfer
04 Safety Rule Enforcement
05 Additional Personnel Assigned to Job
06 Group Cooperation Required
07 Referred to MD, etc.
08 Other

HAD EMPLOYEE RECEIVED PROPER INSTRUCTIONS?_____ RE-INSTRUCTION?_____ WAS A SAFETY RULE PRACTICE VIOLATED?_____ WAS IT WRITTEN?_____ SHOULD IT BE?_____

ESTIMATE OF LOSSES RESULTING FROM INCIDENT (EXCLUDING COMPENSATION AND MEDICAL COSTS):

ADDITIONAL COMMENTS (BASIC CAUSES, CORRECTIVE MEASURES, ETC.)

SAFETY SUPERVISOR | REVIEWED BY LOCATION EXECUTIVE | DATE